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INTEGRATED HYPERSONIC AEROTHERMOELASTIC METHODOLOGY FOR TRANS ATMOSPHERIC VEHICLE (TAV)/THERMAL PROTECTION SYSTEM (TPS) STRUCTURAL DESIGN AND OPTIMIZATION

Thermal Protection System Optimization (TPSOPT)

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This is a Small Business Innovation Research (SBIR) Phase II Report.

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/s/ /s/

[signature of project monitor/in-house author] [signature of supervisor]

/s/

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14. ABSTRACT

This report was developed under a SBIR contract.
The objective of this project was to develop a hypersonic aerothermoelastic methodology that optimizes the Thermal Protection System (TPS) for the Trans Atmospheric Vehicles (TAV) in the re-entry/maneuver flight phases. The outcome of this project is a Thermal Protection System Optimization (TPSOPT) software system that integrates multiple disciplines, including the hypersonic aerodynamics, aerothermodynamics, heat transfer, aeroelasticity, with an automatic optimization technique for the minimum weight design of the TPS while subjected to the temperature constraints. A proper orthogonal decomposition and response surface method (PODIRSM) has also been integrated into the TPSOPT system to accelerate the aerodynamic data generation process. There are three manuals generated for the TPSOPT, namely the TPSOPT Theoretical Manual, the TPSOPT Users Manual and the TPSOPT Applications Manual. The design capability of the TPSOPT system is demonstrated on two wing-body configurations including the X-34 and Micro-X vehicles and is documented in the TPSOPT Applications Manual. In addition, a ZONAIR-Adaptive Modeling Environment (ZONAIR-AME) using the Adaptive Modeling Language (AML) was developed by TechnoSoft, Inc. ZONAIR-AME is expedient aerodynamic mesh generation tool that allows varying of parametric geometry for rapid assessment of aerodynamic design concept.

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Foreword

The Contract No. F33615-02-C-3213, entitled, "Integrated Hypersonic Aerothermoelastic Methodology for TAV/TPS Structural Design and Optimization," was initiated by the United States Air Force Research Laboratory of the Air Force Wright-Patterson AFB. The contract's objective is to develop a hypersonic aerothermoelastic methodology that optimizes the Thermal Protection System (TPS) for the Trans Atmospheric Vehicles (TAV) in the re-entry/maneuver flight phases.

ZONA Technology participants on the subject contract include: Danny Liu, as the program manager; P.C. Chen, as the principal investigator; Xiaowei Gao, as the project engineer; and Reggie Chang, as the project engineer. Hilmi Kamhawi, of TechnoSoft, Inc. as the subcontractor was responsible for the ZONAIR-AME development (Manual IV). The AFRL sponsors are: Amar Bhungalia, amarshi.bhungalia@wpafb.af.mil. This final report covers all technical tasks completed on the contract from its initiation on 27 September 2002 through 27 December 2005.

1.0 INTRODUCTION

1.1 What is TPSOPT

TPSOPT is a software system to design a Thermal Protection System (TPS) on the surface of a hypersonic flight vehicle. It employs an automatic optimization technique to minimize the total weight of the TPS which is subjected to the temperature constraints at each layer of the TPS.

1.2 Background

Current Trans-Atmospheric Vehicle (TAV) design requires aerothermoelastic analysis to ascertain the TAV/TPS structural integrity in extreme hypersonic environments. More urgently, it is required to develop and integrate maturing technologies in key areas, such as hypersonic aerodynamics/aeroheating, propulsion, structures and integrated vehicle systems preferably in a Multidisciplinary Design/analysis Optimization (MDO) manner. In response to these programs, it is required to identify technologies needed to create a new, safe, cost-effective launch system thus to generate an integrated technology plan.

To develop a comprehensive aerothermoelastic program for Reusable Launch Vehicle (RLV)/TPS design requires careful planning of the required disciplines. It appears that thus far all required disciplines have been developed individually to a large extent including the trajectory analysis, the TPS sizing analysis, the thermal/structure analysis and the aerodynamic/aerothermodynamic programs. Thus, to integrate these programs into an efficient MDO procedure is a challenging task. Because the disparate analysis disciplines and their adopted methodologies being at different levels, these programs could not readily constitute a viable RLV/TPS design process. There are many stumbling blocks in achieving this integration task. For example, the low computational efficiency of the high fidelity aerodynamic/surface temperatures would prevent sufficient iterations in the design cycles. The interface between the surface temperature calculations and the structural heat transfer appears to be underdeveloped. Note that the temperature calculation is driven by trajectory analysis and high-fidelity aerodynamic computation; whereas the structural heat transfer analysis is driven by the thermal properties of the TPS and primary structure. Finally, the primary structural loads must be kept synchronized with the structural temperature distributions in order to ensure the primary structure is capable of bearing the in-flight launch loads and re-entry/maneuver loads.

Therefore, for an expedient integrated aerothermodynamics/aerothermoelastic design methodology we realize that a unified hypersonic panel method with high-fidelity aerodynamic surface-compliant panels must be employed. Thus, these panels could be tightly coupled with a structural FEM (Finite Element Method) module such as ASTROS* (Automated STRuctural Optimization Systems), or NASTRAN for an aerodynamic/structural interface in order to ensure a proper MDO procedure. On the other hand, any high-level CFD method would not be suitable as a rapid design tool under the proposed environment. Clearly, for an expedient, high-fidelity aerothermoelastic/aerothermodynamic program, a compatible hypersonic aerodynamic methodology is warranted. ZONAIR is a unified hypersonic/supersonic panel method that

satisfies all requirements and is proven computationally efficient with comparable accuracy to CFD/Euler solutions.

The TPSOPT software system carries out an integrated hypersonic aerothermoelastic methodology for TAV/TPS design/optimization (see TPSOPT Theoretical Manual), which focuses on the hypersonic aerothermoelastic method development and its design/optimization compatibility. It integrates multiple disciplines, including Aerodynamics, Aerothermodynamics, Heat Transfer, Aeroelasticity and Structure Optimization, to design a Thermal Protection System (TPS) on the surface of a hypersonic flight vehicle.

1.3 TPSOPT Formulation

TPSOPT is optimization software which covers multiple discipline knowledge, such as aerodynamics, heat transfer, and size optimization. The aerodynamics task is conducted by ZONAIR, the heat transfer part is implemented by SHABP and MINIVER/EXITS, and the size optimization is performed by the formulation derived in the completion of the Air Force Phase II project. The following is a brief description of the typical formulation (for details go to the TPSOPT Theoretical Manual).

1.3.1. Aerodynamic formulation in ZONAIR

The governing equation used in ZONAIR is the Prandtl-Glauert equation which can be expressed as

$$\left(1 - M_{\infty}^{2} \right) \phi_{xx} + \phi_{yy} + \phi_{zz} = 0 \qquad (1.1)$$

where:

M_{∞} is the freestream Mach number and for incompressible flow ($M_{\infty} = 0$).

ϕ is the velocity potential.

Applying Green's theorem to Eq 1.1, an integral solution for a point p can be obtained:

$$\phi (P) = - \frac{1}{4 \pi} \iint_{S+S_w} [\sigma (Q) \frac{1}{\bar{R}} - \mu (Q) \vec{n} \cdot \nabla (\frac{1}{\bar{R}})] \, dS \qquad (1.2)$$

where:

σ is the source singularity distribution on the configuration S.

μ is the doublet singularity distribution on the configuration S and the wake surface S_w.

$\vec{n}$ is the out-normal vector.

$\bar{R} = \left| \vec{P} - \vec{Q} \right|$ is the distance between the point P and Q.

The boundary condition requires the flow to be tangential only to a moving body, i.e.:

$$\vec{n} \cdot \nabla\phi = -\vec{n} \cdot \vec{V}_\infty \tag{1.3}$$

1.3.2 Heat transfer formulation in MINIVER/EXITS

The heat conduction equation used in EXITS for an isotropic material with one special dimension is:

$$\rho c_p \frac{\partial T}{\partial t} = k \frac{\partial^2 T}{\partial x^2} \tag{1.4}$$

where

T	is the temperature
T	is the time
ρ	is the density
c_p	is the specific heat
k	is the thermal conductivity

The finite difference method is used to solve equation (1.4). For three adjacent discretized points x_1, x_0 and x_2 separated with spaces $\triangle x_1$ and $\triangle x_2$, the second derivative of the temperature at time step n can be expressed as

$$\left.\frac{\partial^2 T}{\partial x^2}\right|_0^n = \frac{2}{\Delta x_1 + \Delta x_2}\left[\frac{T_1^n \Delta x_2 + T_2^n \Delta x_1 - T_0^n(\Delta x_1 + \Delta x_2)}{\Delta x_1 \Delta x_2}\right] \tag{1.5}$$

where T_1, T_0 and T_2 are temperatures at the three points.

The forward difference approximation is taken for the time derivative as shown below

$$\frac{\partial T}{\partial t} = \frac{T_0^{n+1} - T_0^n}{\Delta t} \tag{1.6}$$

and substitute into equation (1.4) it follows that

$$T_i^{n+1} = T_i^n \left(1 - \frac{\Delta t}{C_i}\sum_j K_{ij}\right) + \frac{\Delta t}{C_i}\sum_j K_{ij} T_j^n \tag{1.7}$$

where

$$V_i = \frac{\Delta x_1 + \Delta x_2}{2} \tag{1.8}$$

$$C_i = \rho c_p V_i \tag{1.9}$$

$$K_{ij} = \frac{k}{\Delta x_{ij}} \tag{1.10}$$

The temperature can be solved by an iterative procedure using equation (1.7).

1.3.3 Size optimization

Size optimization is performed by minimizing the total weight of the vehicle surface. To do this, the following objective function is defined for a TPS consisting of *L* layers.

$$F = \sum_{l=1}^{L} \sum_{p=1}^{P} A_p \rho_p^l h_p^l \tag{1.11}$$

where

A_p	is the area of the panel *p*
ρ_p^l	is the density of the panel *p* on layer *l*
h_p^l	is the thickness of the panel *p* on layer *l*
L	is the number of layers
P	is the number of all panels over the patch

The thickness h_p^l of each layer can be expressed with the thickness of element nodes using shape functions as

$$h_p^l = \sum_{\alpha=1}^{M_l} N_\alpha^l(\xi_p, \eta_p) h^{\alpha l} \tag{1.12}$$

where

$h^{\alpha l}$	is the thickness of node α on layer *l*
$N_\alpha^l(\xi_p, \eta_p)$	is the value of shape function α on layer *l* for panel *p*
ξ_p and η_p	is the intrinsic coordinates of panel *p*
M_l	is the number of element nodes on layer *l*

The shape functions $N_\alpha^l(\xi_p, \eta_p)$ can be found in the TPSOPT Theoretical Manual. The objective function *F* shown in equation (1.11) is subjected to the Thickness constraints:

$$H_{\min}^l < h_p^l < H_{\max}^l \tag{1.13}$$

and the temperature constraints:

$$T_{nms}^{\beta} < T_{\max}^{\beta} \tag{1.14}$$

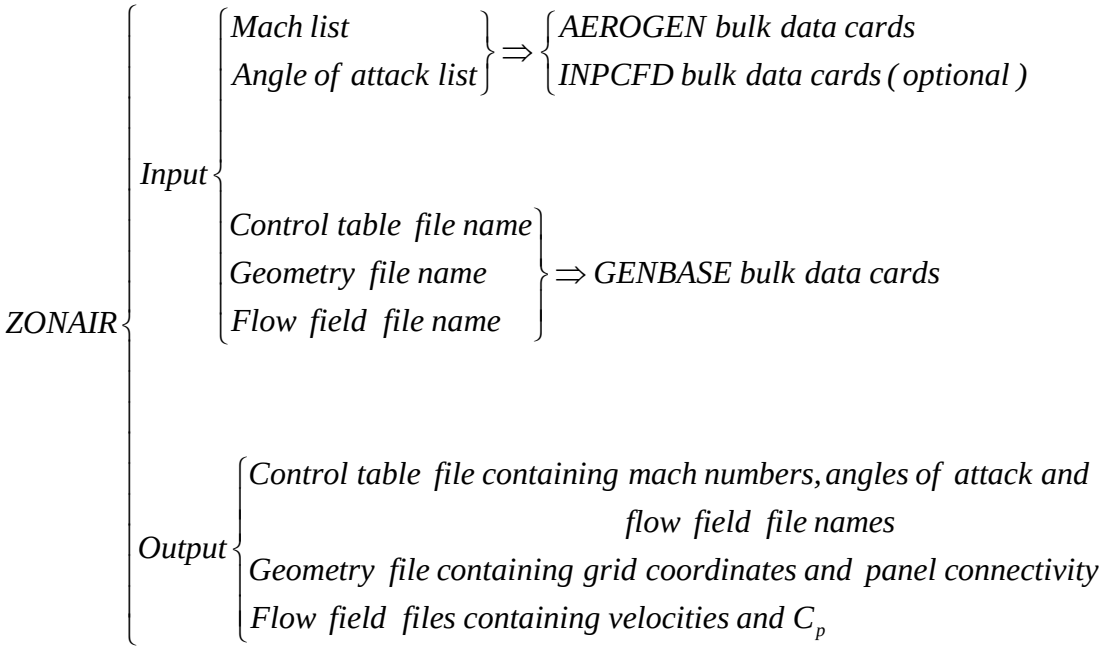
where

$H_{\min}^{l}$ and $H_{\max}^{l}$	is the allowable minimum and maximum thickness for layer *l*
T_{nms}^{β}	is the temperature of hot panel *n* on the side *s* for trajectory *m* at the heat point β
$T_{\max}^{\beta}$	is the allowable maximum temperature of layer heat point β

This optimization problem can be solved by linking a TPS analysis code such as the MINIVER/EXITS module with an optimization driver like the usable/feasible direction method imbedded in ADS.

1.4 Operational Procedure of Using the TPSOPT System

To apply the TPSOPT system to design a TPS a two-step procedure should be followed. The first step is to prepare data and run ZONAIR, and the other is to use the TPSOPT software. Figure 1.1 is a skeleton of the two steps. Following the figure are detailed descriptions of the steps.



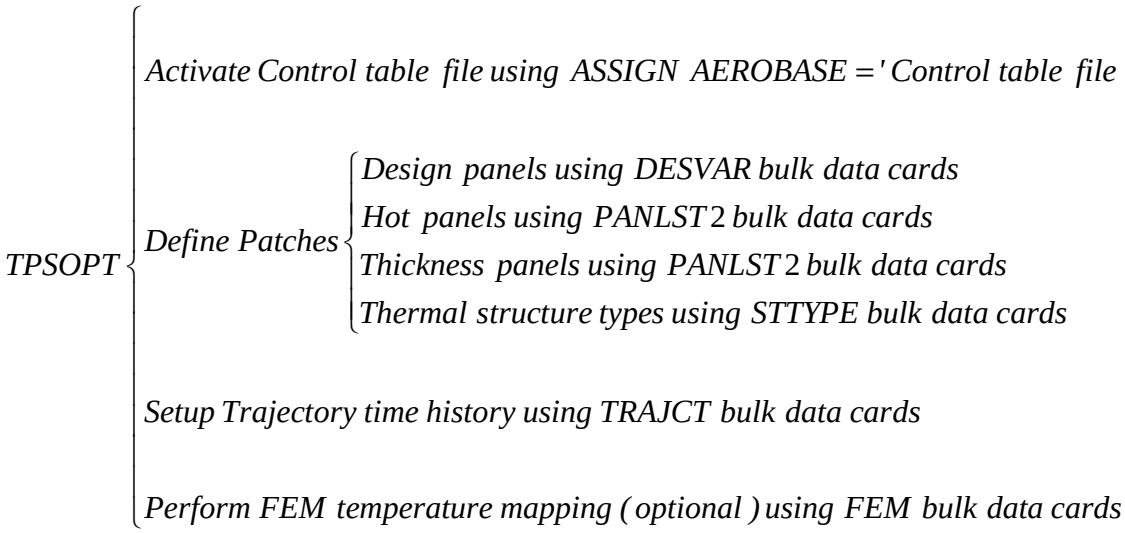


Figure 1.1. Outline of two-step procedure to use TPSOPT

Step 1: Run ZONAIR to Setup Aerodynamic Database Files

To setup aerodynamic database files which are necessary input information to run TPSOPT, the aerodynamic software ZONAIR is first executed for different combinations of Mach number, M, and angle of attack, α. The ZONAIR input geometry model should cover the whole surface of the TPS to be designed. The aerodynamic database files will be generated according to the combination sequence of the Mach number and angle of attack by using the ZONAIR input bulk data card AEROGEN. The AEROGEN cards are numbered in ascending order for both Mach number and angle of attack. For example, Table 1.1 shows the case of 5 Mach numbers (2, 4, 6, 8, 10) and 4 angles of attack (0, 4, 7, 10).

Table 1.1. Combination of 5 Mach numbers and 4 angles of attack

AEROGEN Card Number	M	α
1	2.0	.0
2	4.0	.0
3	6.0	.0
4	8.0	.0
5	10.	.0
6	2.0	4.0
7	4.0	4.0
8	6.0	4.0
9	8.0	4.0
10	10.	4.0
11	2.0	7.0
12	4.0	7.0
13	6.0	7.0
14	8.0	7.0
15	10.	7.0
16	2.0	10.

17	4.0	10.
18	6.0	10.
19	8.0	10.
20	10.	10.

If CFD results are used to replace the ZONAIR results, then in addition to the AEROGEN cards, the INPCFD bulk data cards are also needed in the ZONAIR input file and they should have the same card numbers as the AEROGEN cards.

It is noted that the ranges of Mach number and angle of attack should cover the minimum and maximum values of the Mach number and angle of attack specified in the trajectory data in the TPSOPT input file.

After running ZONAIR, an aerodynamic database is generated, which consists of three types of files: the Control table file, the Geometry file, and the flow field files. The Control table file, containing the combination table of the Mach number and angle of attack, is output in ASCII format, the geometry file, containing the grid coordinates and panel connectivity, is written in the binary format, and the flow field files (one file for one AEROGEN card), containing the velocities and C_p , are generated in OUTPUT4 format.

In order to use the database, the name of the Control table file, say CTRTABLE.DAT, should be assigned in the TPSOPT input file by the following statement

ASSIGN AEROBASE='CTRTABLE.DAT'

And other two database files will be activated automatically by this Control table file.

Step 2: Run TPSOPT to Perform Size Optimization

After the aerodynamic database is established by running ZONAIR, users can setup bulk data cards for the TPSOPT input file based on the geometry provided by the ZONAIR output geometry file. The central tasks of setting up the TPSOPT input file are the definition of patches over the TPS and generation of the trajectory time history data for thermal analysis. The definition of patches includes defining design variable panels, hot panels and thickness panels as well as the thermal structure types. Usually, the smaller the number of patches defined over the TPS, the smoother the optimal TPS surface is, of course, the lower the level of the optimization is achieved. The trajectory time history data consist of values of Mach number, altitude and angle of attack at different time moments. The number of time moments selected heavily influences the computational time and accuracy. The fewer time moments, the shorter the computational time is consumed and the poorer the accuracy of the computational result is.

If temperature mapping from optimal TPS to the structure surface (FEM surface elements) is required, FEM input file (only NASTRAN input file is available so far) needs to be specified using FEM bulk data card.

1.5 About the Application Manual

The objectives of the application manual is to provide guidelines and sample cases to demonstrate the key features and uses of the TPSOPT software system. This manual presents four sample cases for the generation of the optimal thickness and temperature mapping files.

2.0 Simplified X-34 Wing-Body Configuration

- *Purpose*: To demonstrate the applicability of the TPSOPT software system for the X-34 configuration over a wide range of flight conditions.

- *Input File*:
  - Standard input File: X34TPS.INP (Listing 2.1)
  - Aerodynamic Database: CTRTABLE.DAT (Listing 2.2)
  - Geometry File: X34GEO.DAT (Binary file)
  - ZONAIR Solution File: FLOWi (Listing 2.3)

- *Output File*:
  - Standard Output File: X34TPS.OUT (Listing 2.4)
  - Vehicle Surface Mesh: X34SURF.NAS (Figure 2.1)
  - Response surfaces for POD analysis (Figure 2.4)
  - C_p and Temperature Plot File: CPTEMP.PLT (Figure 2.5)
  - Optimal Thickness Distribution Plot File: X34THICK.PLT (Figure 2.6)

2.1 Surface Panels of X-34 Wing-Body Configuration

The simplified X-34 wing-body configuration consists of a body with a round nose of 7.0" radius, a strake, and a swept wing which are shown in Figure 2.1. The surface mesh is generated by ZONAIR and outputted as a binary file "X34GEO.DAT". Due to symmetry, only half of the configuration is considered in the ZONAIR model which consists of 1554 panels and 1559 grid points. These panels and grid points are stored in the file "X34GEO.DAT" which is used in TPSOPT by specifying the name on the second row of the aerodynamic database (CTRTABLE.DAT) that is imported by the "ASSIGN AEROBASE=" executive control command.

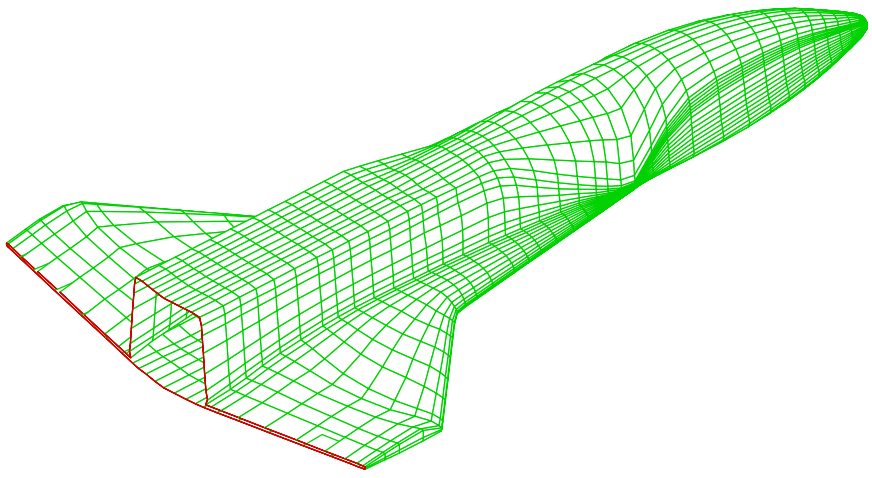


Figure 2.1. X-34 surface mesh

2.2 The Aerodynamic Database: CTRTABLE.DAT

The aerodynamic database is generated by running ZONAIR for 68 combinations of 4 Mach numbers (2, 5, 8, 10) and 17 angles of attack (0, 6, 10, 13, 15, 17, 19, 21, 22-30). This database provides the TPSOPT system with all flow field information from ZONAIR. The first row is a title card (X34); the second row provides the geometry file name (X34GEO.DAT); the third and fourth rows list the name of the reference chord, span, …etc, and their values, respectively; the fifth row lists the names of items in the following rows (Mach number, Altitude, Angle of attack, etc.), and the remaining rows contain the values of the items listed in the fifth row and, in the last column, the file names (FLOW0001-FLOW0068) which store the velocities and pressure coefficients for the combinations of the Mach number and Angle of attack listed in the corresponding row.

It is noted that the order of the Mach numbers and angles of attack in the table must be ascending.

2.3 The Standard Input File (X34TPS.INP)

The standard input file consists of two major parts: the flow field quantities and TPS optimization system. The flow field quantities are provided by ZONAIR and imported by the aerodynamic database file (CTRTABLE.DAT) using the following statement on the first row:

```
ASSIGN AEROBASE='CTRTABLE.DAT'
```

The TPS optimization system is the major portion of the standard input file, which includes specification of trajectory data and definition of patches for the TPS. Fourteen patches are defined for the X-34 configuration (Figure 2.2), among which the patches 2, 5, 10, 12 and 14 which are defined on the lower surface of the vehicle and patch 9 is located over the leading edge of the horizontal wing. Figure 2.3 shows individual patches and panel numbers over them.

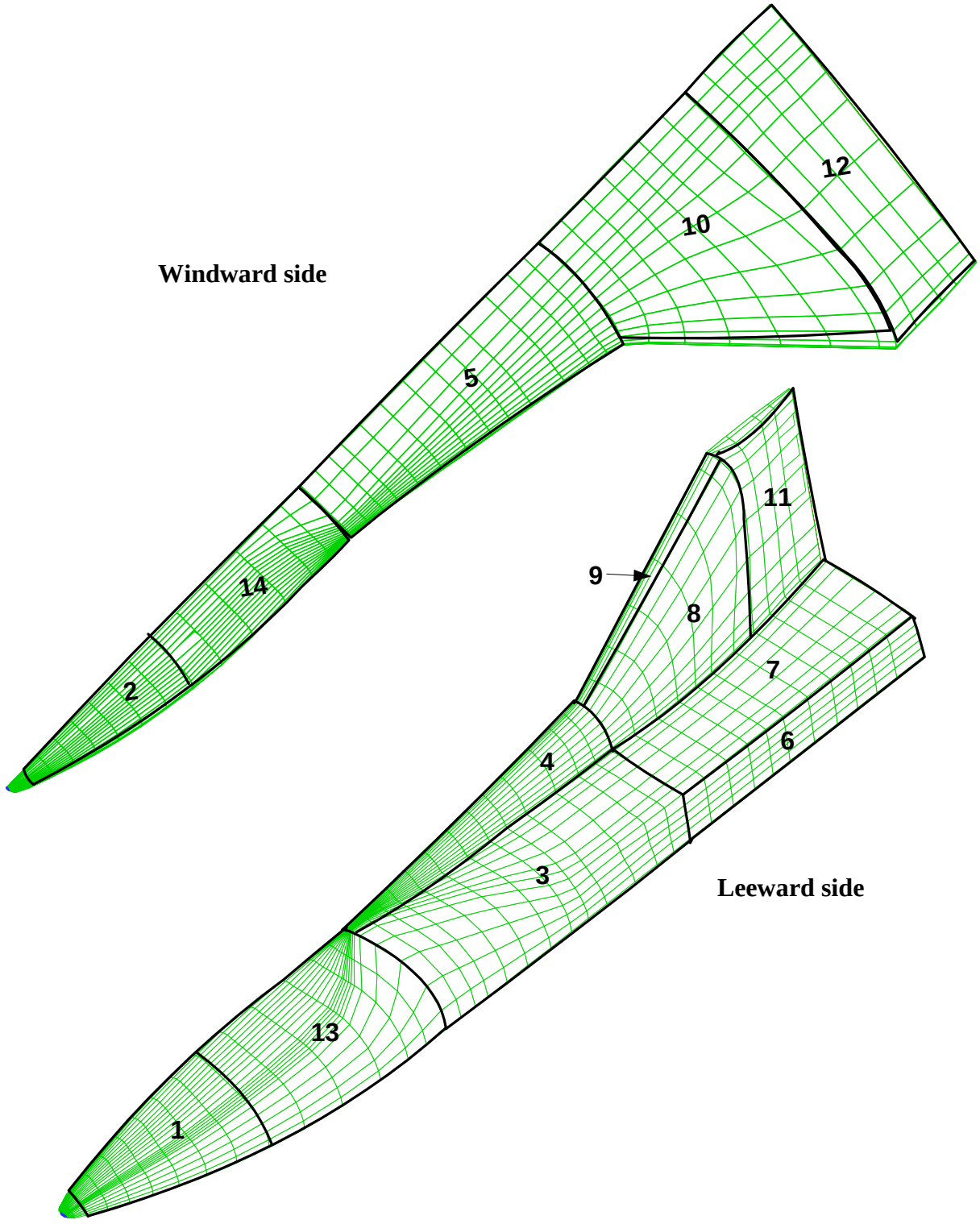
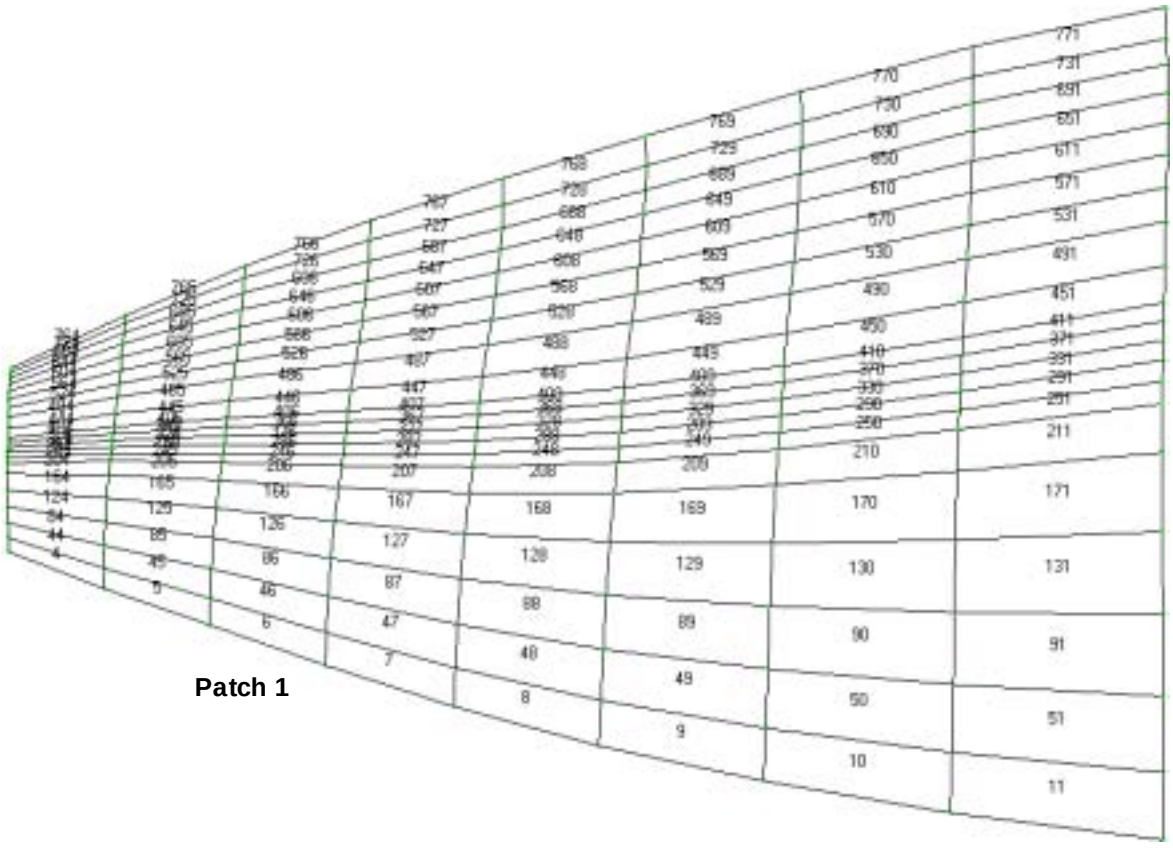


Figure 2.2. Fourteen patches defined over the surface of X-34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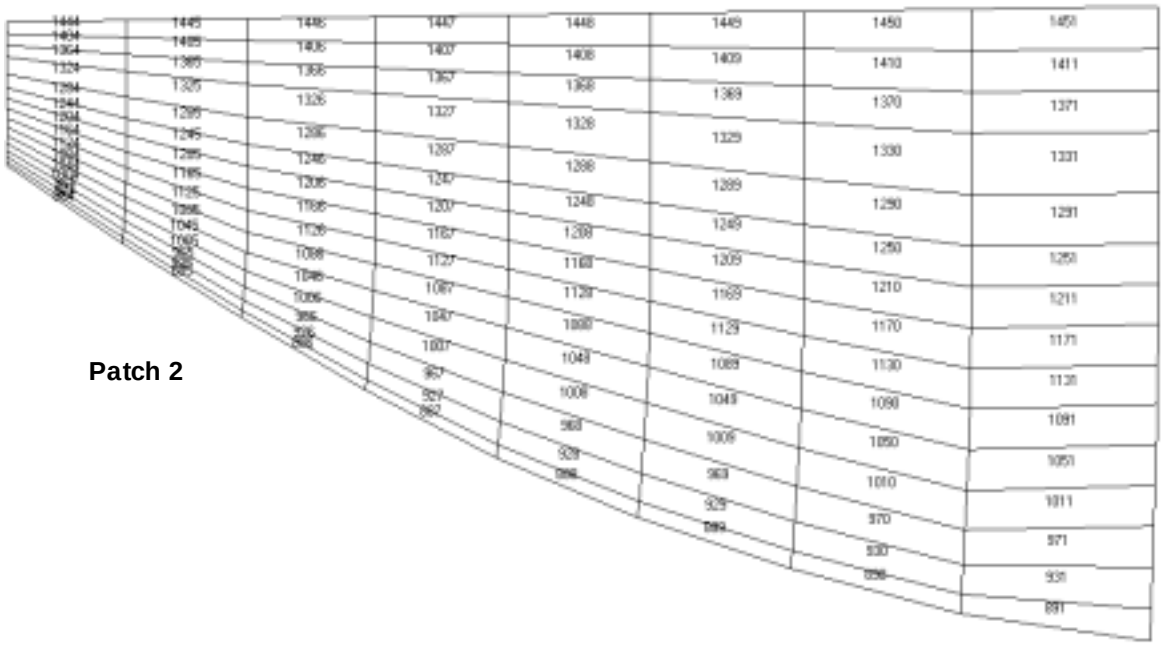
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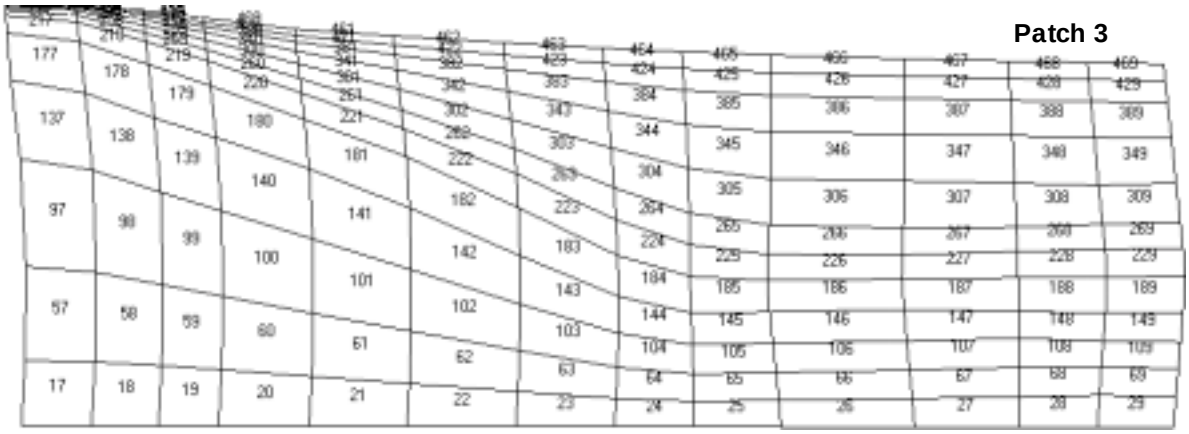

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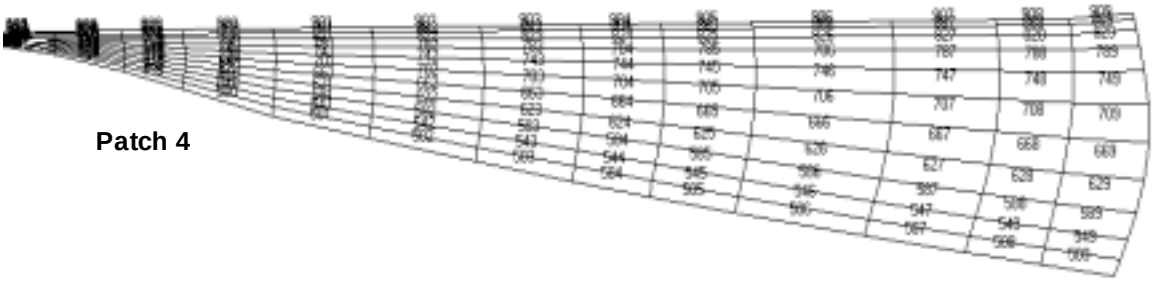

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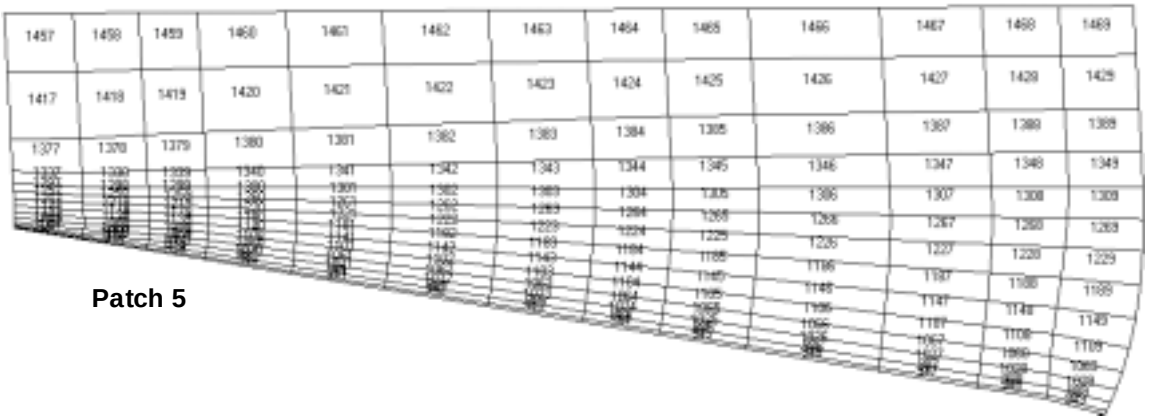

Patch 5

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110	111	112	113	114	115	116	117	118	119	120
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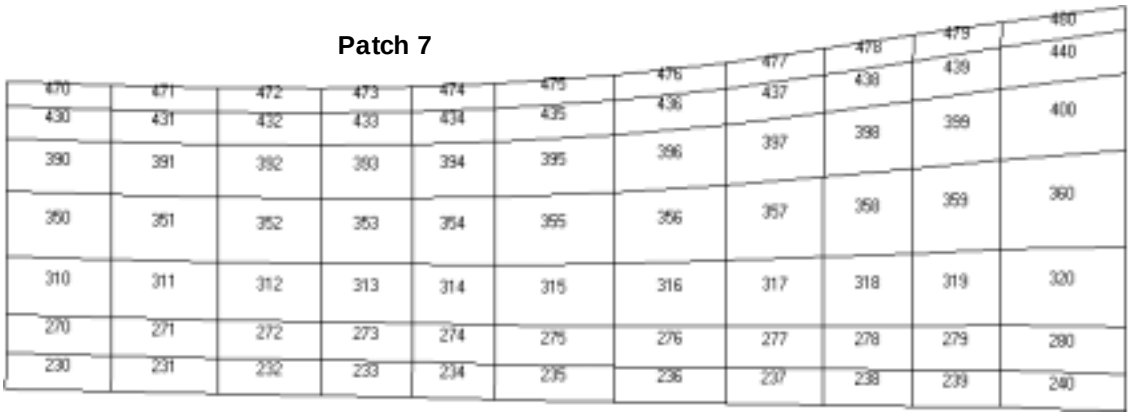
30	31	32	33	34	35	36	37	38	39	40

Patch 6

Patch 7



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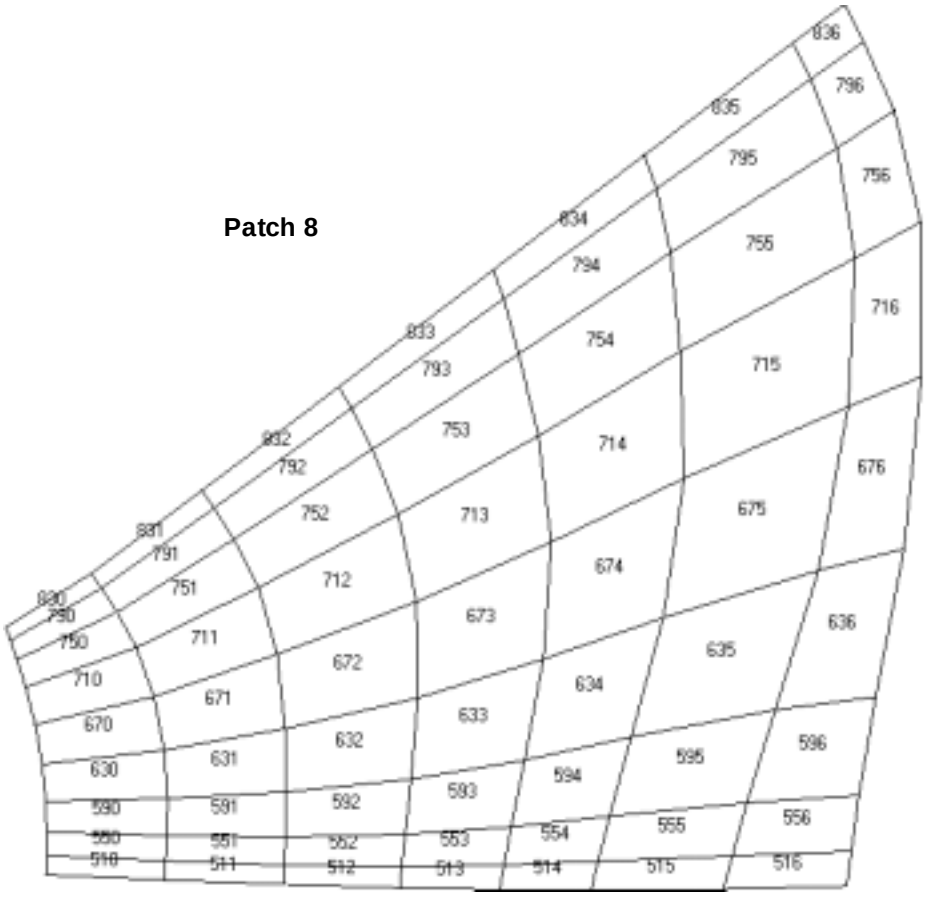
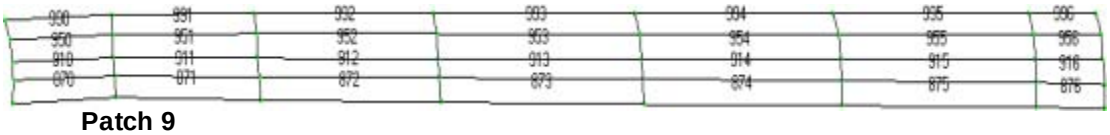
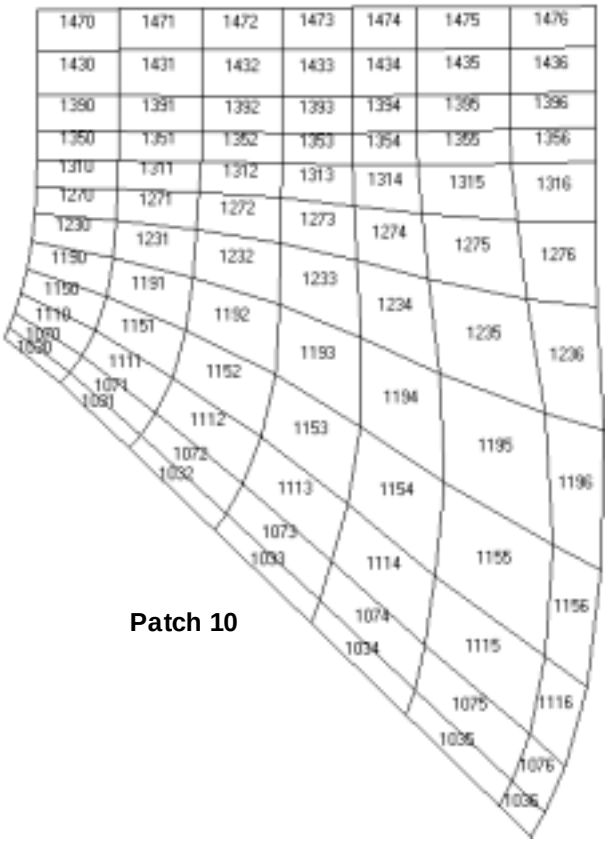
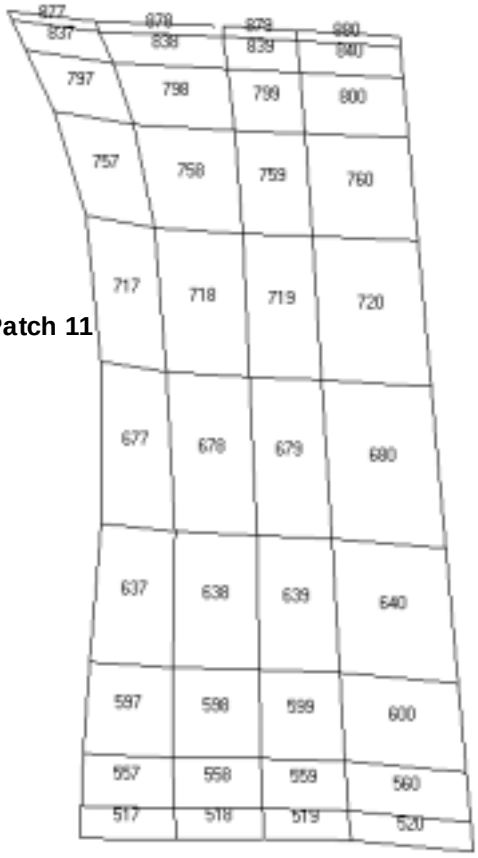




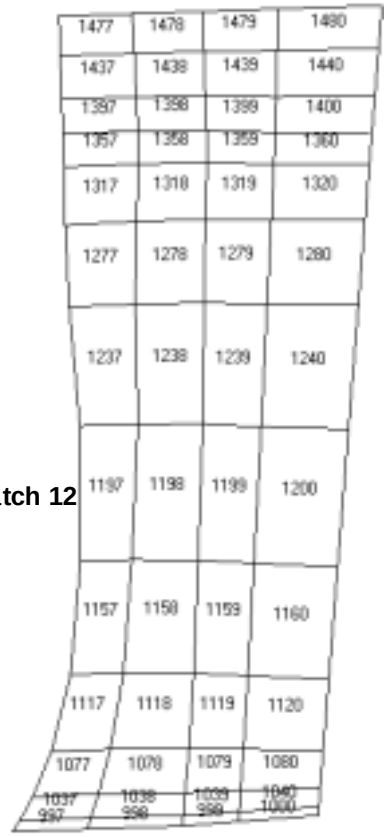
Patch 9



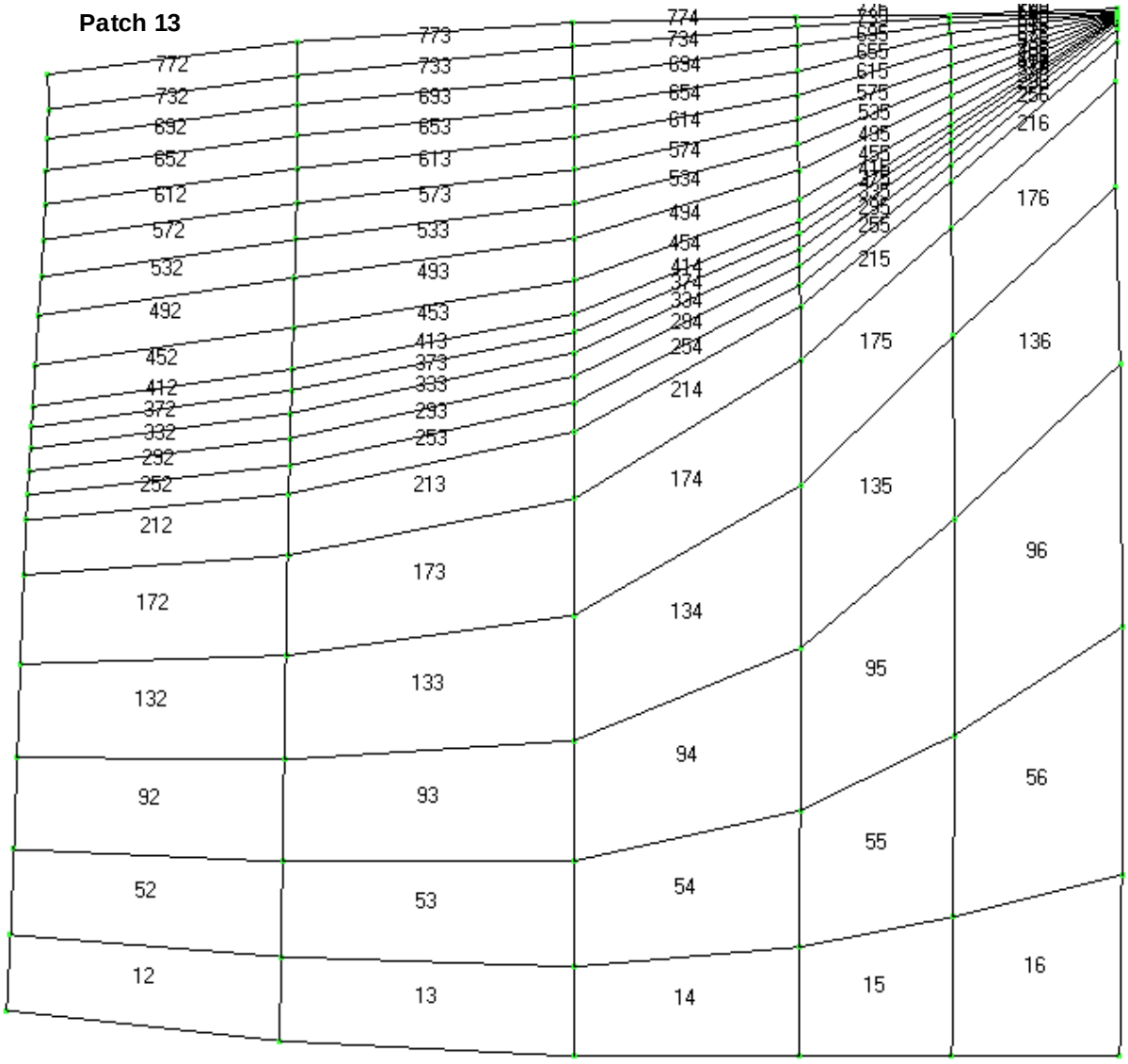
Patch 10



Patch 11



Patch 12


Patch 13
772
732
692
652
612
572
532
492
452
412
372
332
292
252
212
172
132
92
52
12
773
733
693
653
613
573
533
493
453
413
373
333
293
253
213
173
133
93
53
13
774
734
694
654
614
574
534
494
454
414
374
334
294
254
214
174
134
94
54
14
175
135
95
55
15
216
176
136
96
56
16

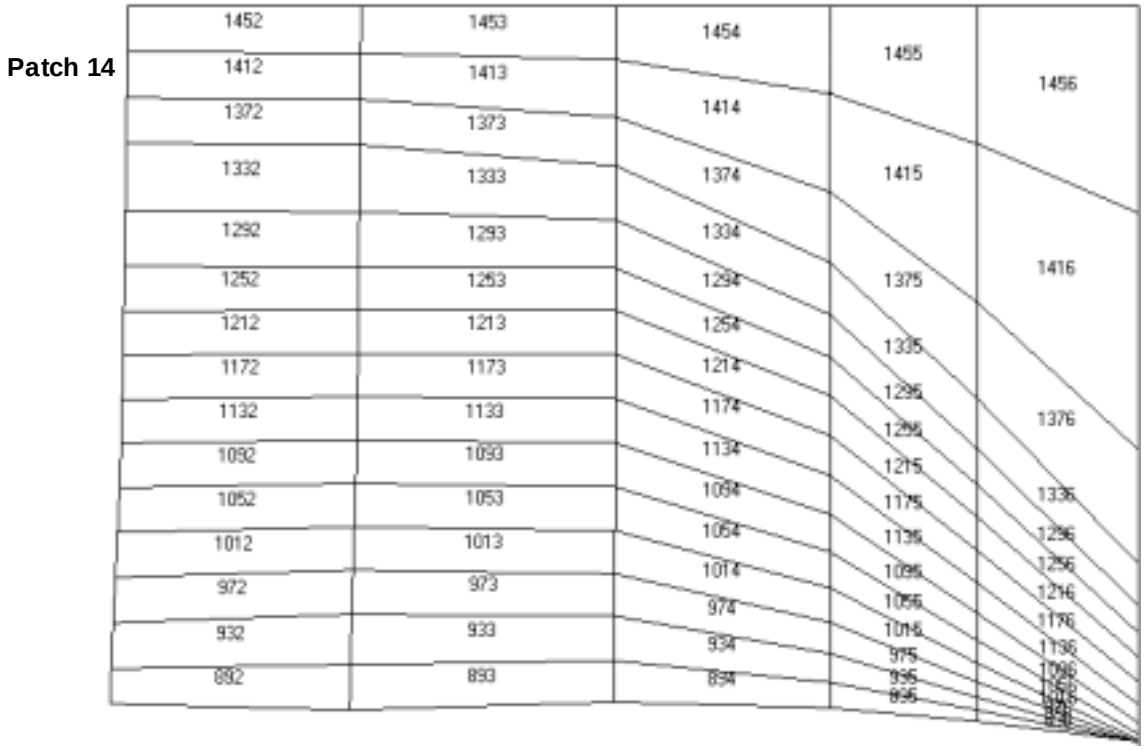


Figure 2.3. Fourteen separated patches defined over X-34

2.4 Thermal Structures for Patches

Two sets of thermal structures are used for the X-34 TPS. The last layer of either set is a structure layer, that is, no design panels are defined over it.

The first set of structures consists of 4 layers denoted using the bulk data card STTYPE numbers of 21, 23, 24, 25, respectively. The structures for the 4 layers are Slab, Honeycomb, Corrugated standoff, Slab, respectively, and material numbers for the optimization thickness parts of the five layers are 221 (HRSI COATING), 103 (ALUMINUM 7075-T6), 114 (INCONEL 617), and 101 (ALUMINUM 2024-T4). This set of thermal structures is defined for nose-near patches 1 and 2, and leading edge patch 9.

The second set of structures consists of 6 layers denoted using the bulk data card STTYPE numbers of 31, 32, 33, 34, 35, 36, respectively. The structures for the 6 layers are Thin skin, Slab, Thin skin, Slab, Thin skin, Slab, respectively.The materials for these layers are 221 (HRSI COATING), 266 (AB312 Fabric), 260 (Q-Felt(3.5 PCF)), 266 (AB312 Fabric), 245 (RTV-560), and 101 (ALUMINUM 2024-T4). This set of thermal structures is defined for patches 3-8 and 10-14.

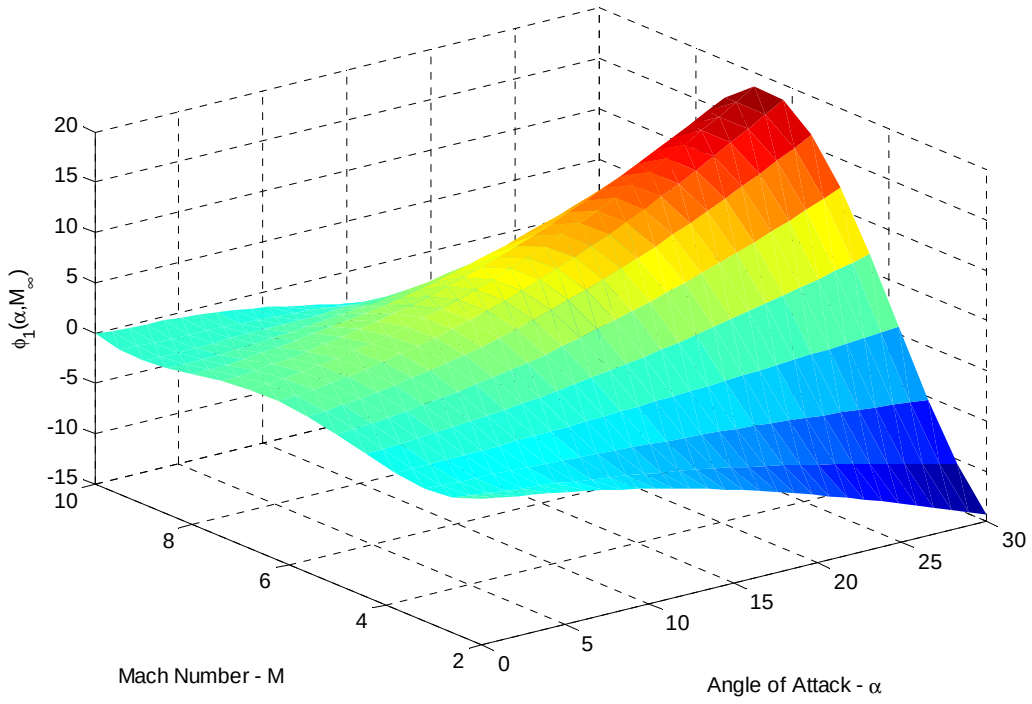
2.5 Output Information

The output information consists of the following items:

(1) Response surfaces of C_p and velocities for POD analysis (Plot files)
(2) C_p and temperatures for specified time steps in trajectory bulk data cards (Plot files)
(3) Schematic text plotting of trajectory-related thermal quantities versus time over every patch. These quantities include enthalpy-based heat transfer coefficient, adiabatic wall enthalpy, and pressure.
(4) Thickness of every design layer and the ratio of objective function values between optimal and initial thickness
(5) Schematic text plotting of optimal thickness and maximum temperature over each layer for every patch
(6) Optimal thickness and temperature over each layer for every panel (Plot file)

2.6 Results

The output items listed in Section 2.5 have been stored in a text file and some plotting files. The text file is the Standard Output File (X34TPS.OUT) which includes all the input information appearing in the Standard Input File (X34TPS.INP) and items (3)-(5) listed in the above section. Figures 2.4-2.6 show the response surfaces of C_p, and C_p and temperatures specified in the trajectory bulk data card, as well as the optimal thickness, respectively.



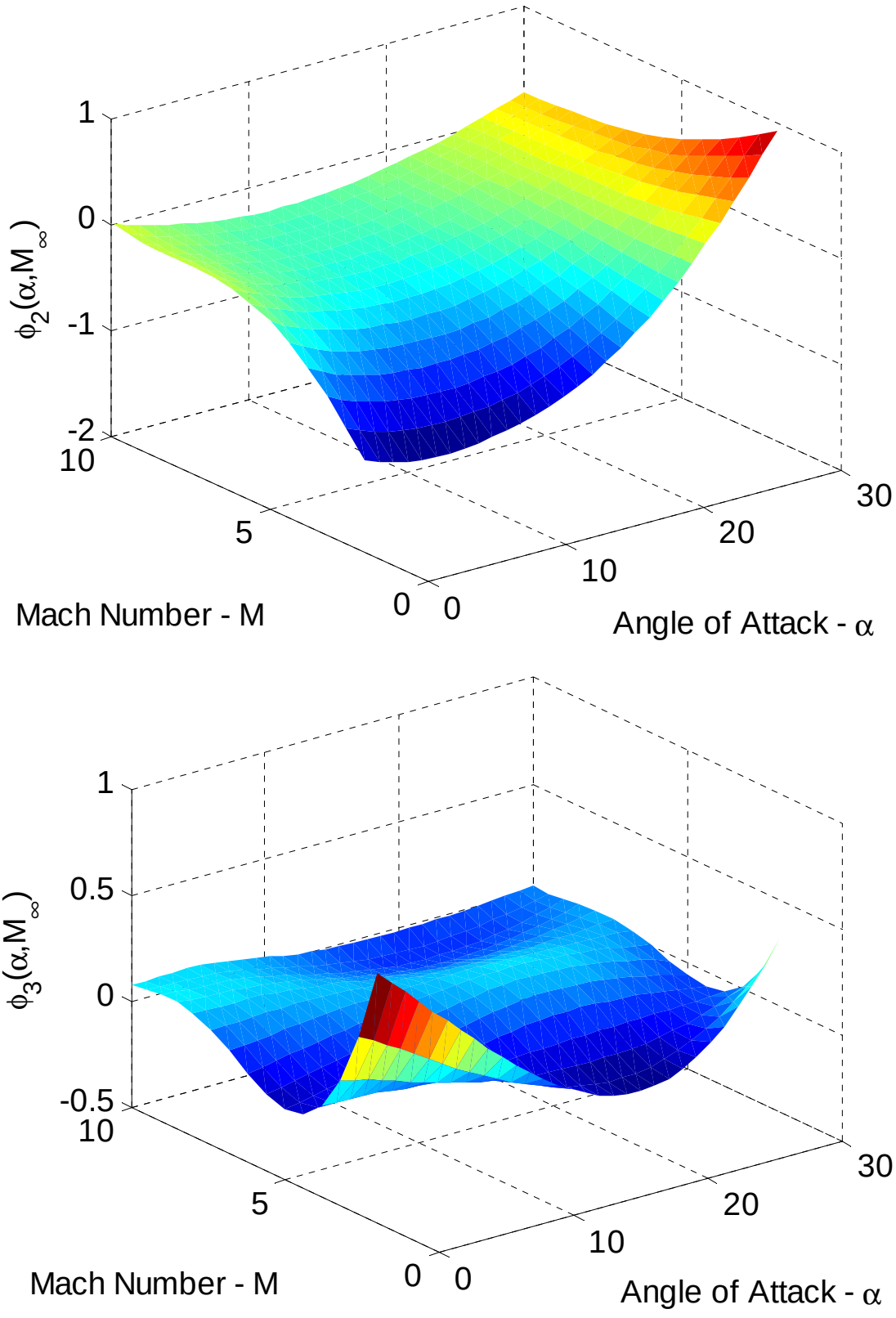


Figure 2.4. Response Surface of first three modes for POD analysis

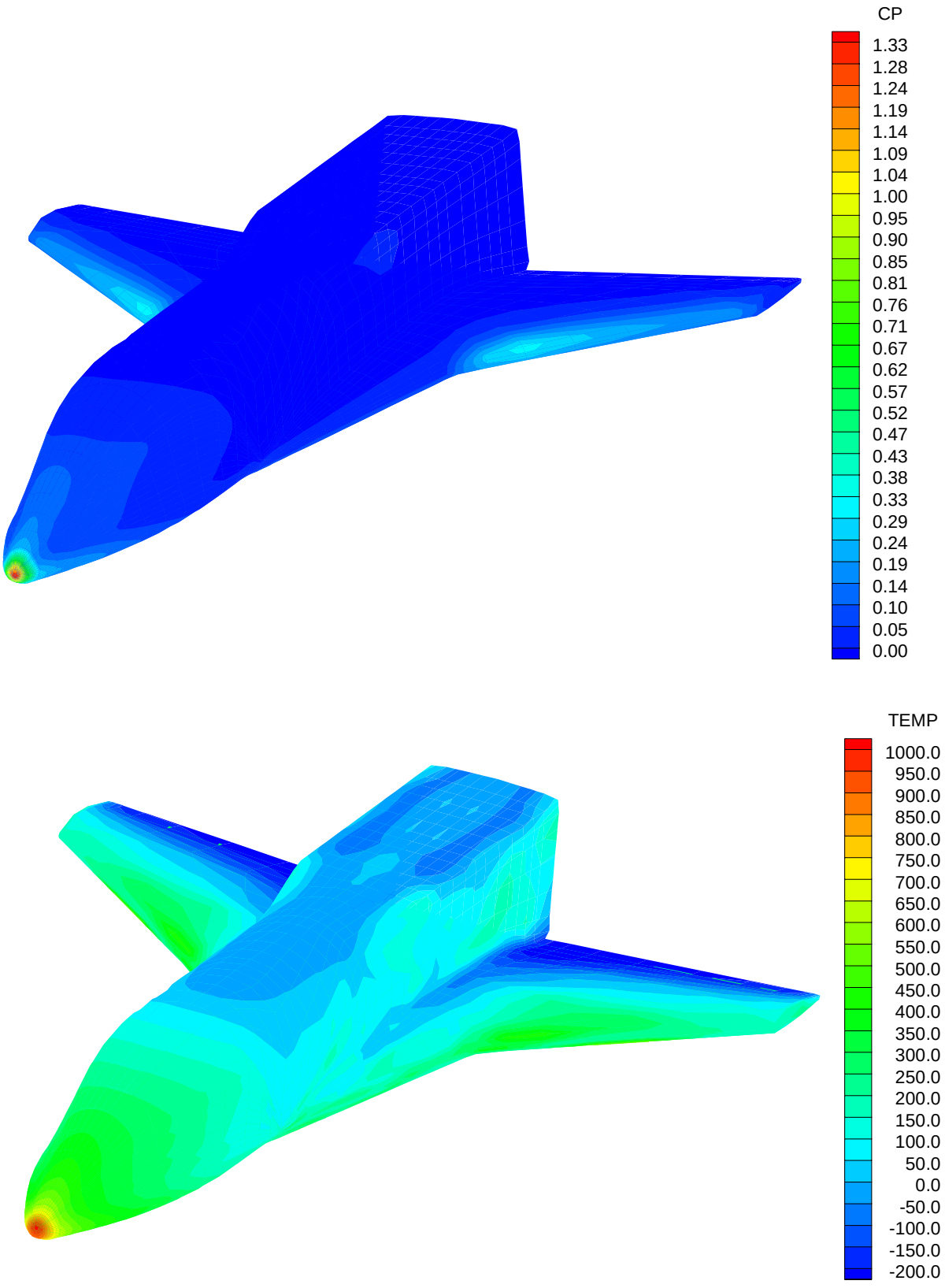
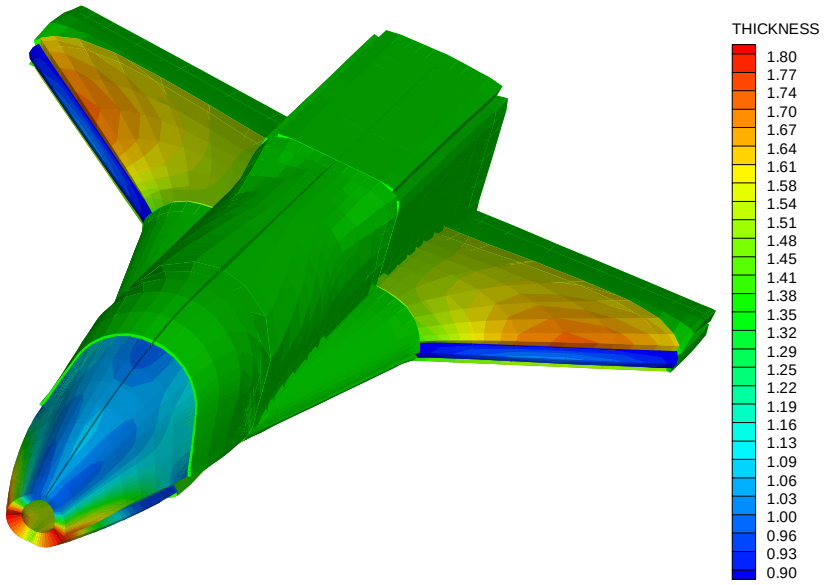
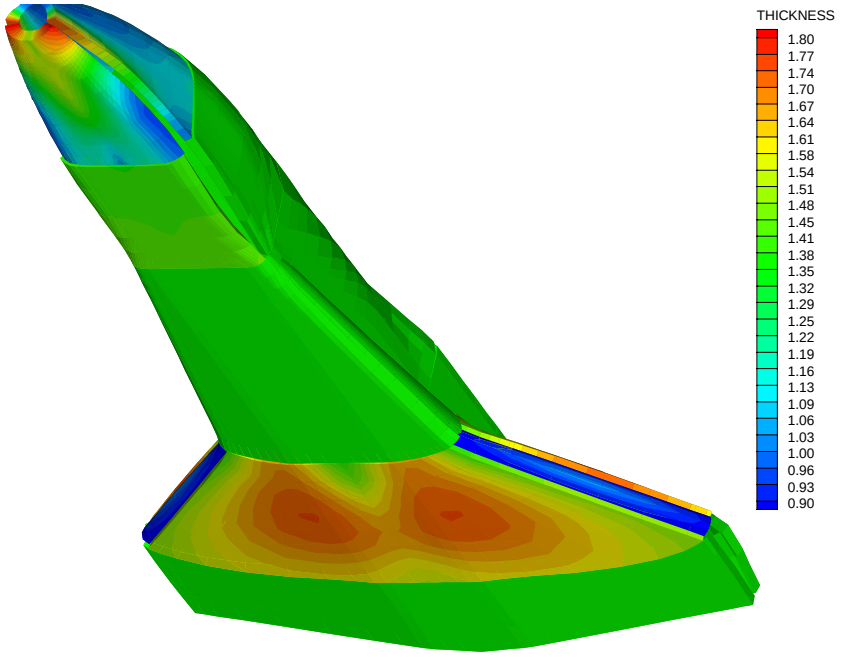


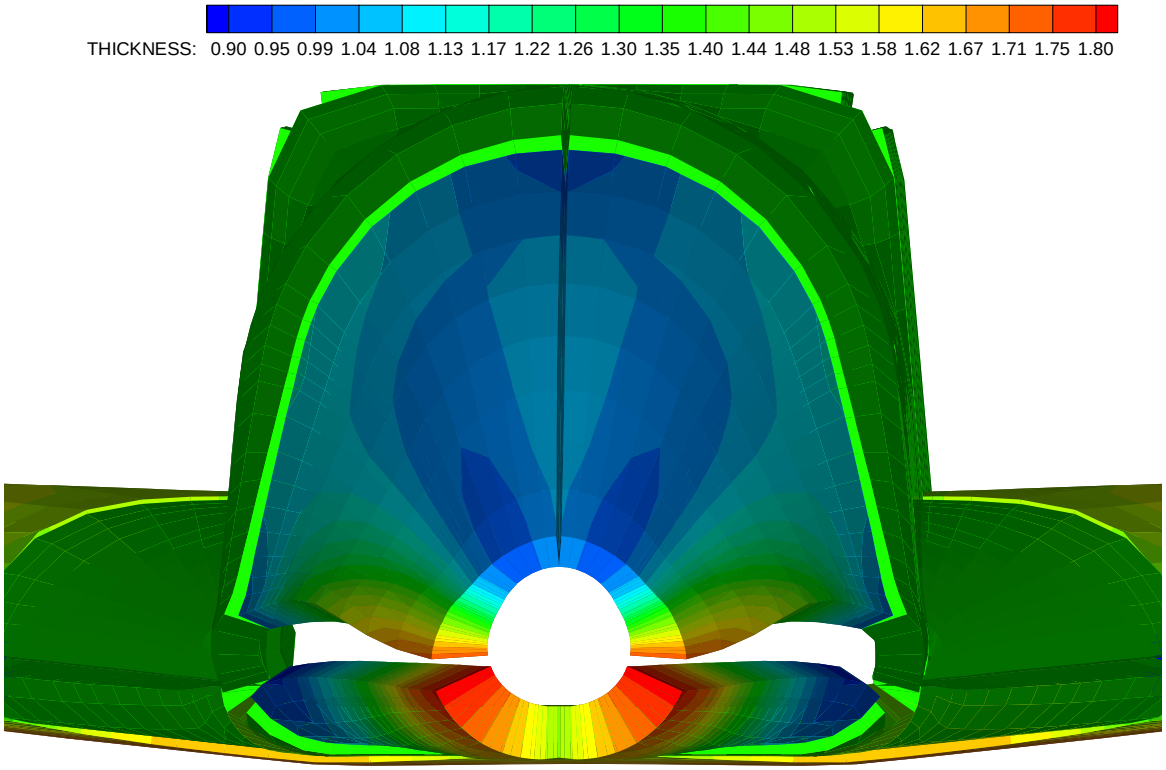
Figure 2.5. Plots of C_p and temperature at time=225 with M=8.8, AoA=10.225



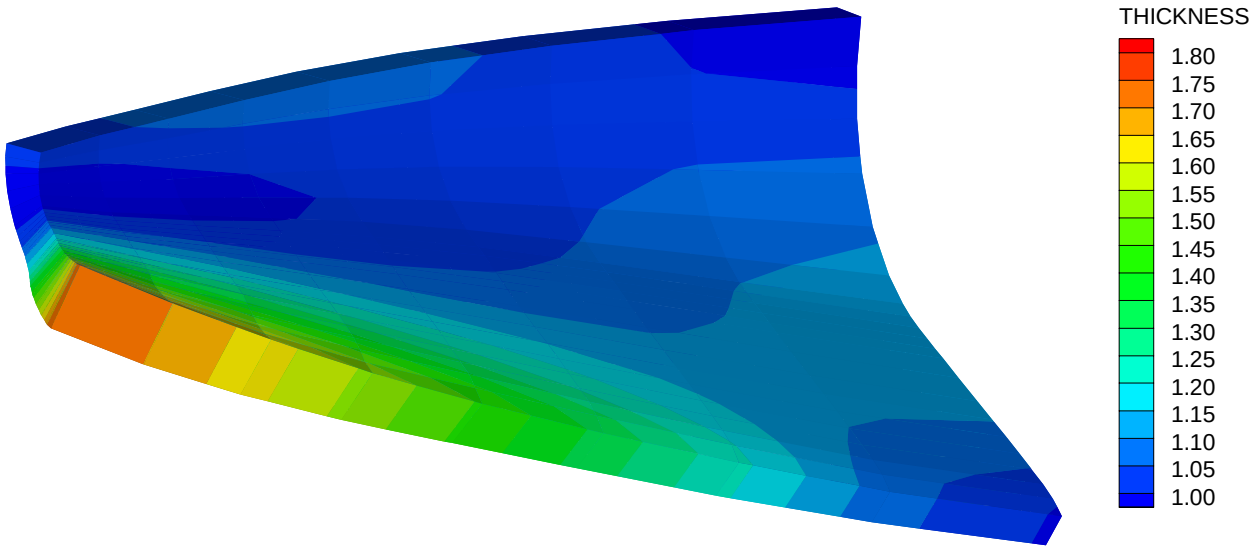
Leeward surface



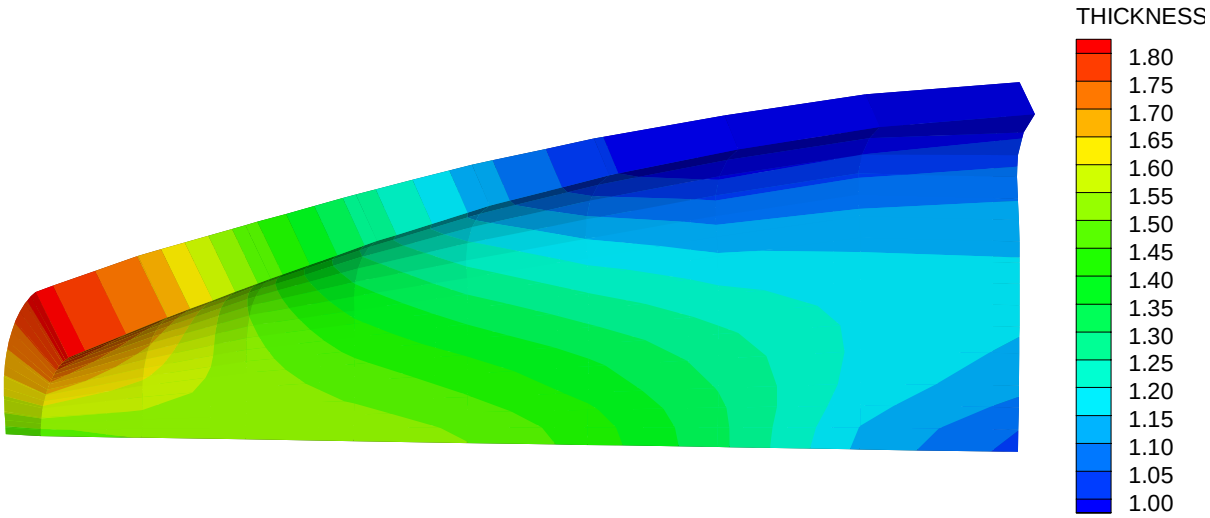
Windward surface



Front view



Patch 1



Patch 2

Figure 2.6 Plot of the optimal thickness of the TPS

2.7 Lists of Input and Output Files

- *Input Data Listing:*

Listing 2.1 Standard input File: X34TPS.INP

```
ASSIGN AEROBASE='CTRTABLE.DAT',PRINT=0
SOL 1
$ Begin Executive Control Section
CEND
ECHO = SORT
SUBCASE = 1
        SUBTITLE=TPS OPTIMISATION FOR X34
        LABEL= HYPERSONIC AERODYNAMIC DATABASE BY ZONAIR
        TPSDES=1
$
BEGIN BULK
$
$ PLOTTING AERODYNAMIC MODEL
PLTAERO 1       YES     NO              NASTRAN X34SURF.NAS
$ POLTTING TPS THICKNESS
PLTTPS  1       1       ALL     TECPLOT  THICKML.PLT    -4.0
PLTTPS  -2      1       ALL     TECPLOT  THICK1L.PLT    -4.0
$
$TPSDES SETID   PODRSM  TRJLST  IFPREH  IDFEM/TPSSYM
TPSDES  1       1       1         2     101                             CONT
CONT    1       2       3       4       5       6       7       8       CONT
CONT    9       10      11      12      13      14
$FEM    |IDFEM  |IDCORD |FLIP   |FMUNIT |FLUNIT |FORM   |NMINP1 |NMINP2 |CONT   |
FEM     101                             IN      TECPLOT X34_DYN.DAT      CONT
CONT     X34_DYN.OUT
$PODRSM |TPSDES |METHOD |NRDMOD |TOLER  |NEURON |SAVE   |FILENM
```

```
PODRSM  1       1                               SAVE    X34M1.RST       CONT
CONT    CPPODRSM.P3D    UPODRSM.P3D     VPODRSM.P3D     WPODRSM.P3D
$
$TPSSYM SETID   IDPATCH NLAYER
TPSSYM  1        1      4       4                                       CONT
CONT    1        21     0.08    2.                                      CONT
CONT    1        23     0.3     1.5                                     CONT
CONT    1        24     0.4     1.3                                     CONT
CONT    0        25     0.1     1.2
TPSSYM  2        2      4       4                                       CONT
CONT    2        21     0.08    2.                                      CONT
CONT    2        23     0.3     1.5                                     CONT
CONT    2        24     0.4     1.3                                     CONT
CONT    0        25     0.1     1.2
TPSSYM  3        3      6       4                                       CONT
CONT    3        31     0.05    1.                                      CONT
CONT    3        32     0.08    0.6                                     CONT
CONT    3        33     1.00    3.                                      CONT
CONT    3        34     0.05    0.5                                     CONT
CONT    3        35     0.05    0.5                                     CONT
CONT    0        36     0.1     0.2
TPSSYM  4        4      6       4                                       CONT
CONT    4        31     0.05    1.                                      CONT
CONT    4        32     0.08    0.6                                     CONT
CONT    4        33     1.00    3.                                      CONT
CONT    4        34     0.05    0.5                                     CONT
CONT    4        35     0.05    0.5                                     CONT
CONT    0        36     0.1     0.2
TPSSYM  5        5      6       4                                       CONT
CONT    5        31     0.05    1.                                      CONT
CONT    5        32     0.08    0.6                                     CONT
CONT    5        33     1.00    3.                                      CONT
CONT    5        34     0.05    0.5                                     CONT
CONT    5        35     0.05    0.5                                     CONT
CONT    0        36     0.1     0.2
TPSSYM  6        6      6       4                                       CONT
CONT    6        31     0.05    1.                                      CONT
CONT    6        32     0.08    0.6                                     CONT
CONT    6        33     1.00    3.                                      CONT
CONT    6        34     0.05    0.5                                     CONT
CONT    6        35     0.05    0.5                                     CONT
CONT    0        36     0.1     0.2
TPSSYM  7        7      6       4                                       CONT
CONT    7        31     0.05    1.                                      CONT
CONT    7        32     0.08    0.6                                     CONT
CONT    7        33     1.00    3.                                      CONT
CONT    7        34     0.05    0.5                                     CONT
CONT    7        35     0.05    0.5                                     CONT
CONT    0        36     0.1     0.2
TPSSYM  8        8      6       4                                       CONT
CONT    8        31     0.05    1.                                      CONT
CONT    8        32     0.08    0.6                                     CONT
CONT    8        33     1.00    3.                                      CONT
CONT    8        34     0.05    0.5                                     CONT
CONT    8        35     0.05    0.5                                     CONT
CONT    0        36     0.1     0.2
TPSSYM  9        9      4       4                                       CONT
CONT    9        21     0.08    2.                                      CONT
CONT    9        23     0.3     1.5                                     CONT
CONT    9        24     0.4     1.3                                     CONT
CONT    0        25     0.1     1.2
TPSSYM  10       10     6       4                                       CONT
CONT    10       31     0.05    1.                                      CONT
CONT    10       32     0.08    0.6                                     CONT
CONT    10       33     1.00    3.                                      CONT
CONT    10       34     0.05    0.5                                     CONT
CONT    10       35     0.05    0.5                                     CONT
CONT    0        36     0.1     0.2
TPSSYM  11       11     6       4                                       CONT
CONT    11       31     0.05    1.                                      CONT
CONT    11       32     0.08    0.6                                     CONT
```

```
CONT    11       33     1.00    3.                                      CONT
CONT    11       34     0.05    0.5                                     CONT
CONT    11       35     0.05    0.5                                     CONT
CONT    0        36     0.1     0.2
TPSSYM  12       12     6       4                                       CONT
CONT    12       31     0.05    1.                                      CONT
CONT    12       32     0.08    0.6                                     CONT
CONT    12       33     1.00    3.                                      CONT
CONT    12       34     0.05    0.5                                     CONT
CONT    12       35     0.05    0.5                                     CONT
CONT    0        36     0.1     0.2
TPSSYM  13       13     6       4                                       CONT
CONT    13       31     0.05    1.                                      CONT
CONT    13       32     0.08    0.6                                     CONT
CONT    13       33     1.00    3.                                      CONT
CONT    13       34     0.05    0.5                                     CONT
CONT    13       35     0.05    0.5                                     CONT
CONT    0        36     0.1     0.2
TPSSYM  14       14     6       4                                       CONT
CONT    14       31     0.05    1.                                      CONT
CONT    14       32     0.08    0.6                                     CONT
CONT    14       33     1.00    3.                                      CONT
CONT    14       34     0.05    0.5                                     CONT
CONT    14       35     0.05    0.5                                     CONT
CONT    0        36     0.1     0.2
$       FOR NOSE SECTION ADN LEADING EDGE OF WING
STTYPE  21       1      221                                             CONT
CONT    0.1
STTYPE  22       1      206                                             CONT
CONT    0.5
STTYPE  23       3      103     103     103                             CONT
CONT    0.12    0.11    0.095   0.75    0.3
STTYPE  24       4      114     114     127                             CONT
CONT    0.08    0.08    0.12    1.0     0.8
STTYPE  25       1      101                                             CONT
CONT    0.1
$   AFRSI BLANKET FOR OTHER PART OF THE VEHICLE
STTYPE  31       6      221                                             CONT
CONT    0.08
STTYPE  32       1      266                                             CONT
CONT    0.18
STTYPE  33       6      260                                             CONT
CONT    2.0
STTYPE  34       1      266                                             CONT
CONT    0.11
STTYPE  35       6      245                                             CONT
CONT    0.1
STTYPE  36       1      101                                             CONT
CONT    0.15
$
PRVAL   4                90000000  50.0   15.     1.1
$
$PATCH  ID      RHSPAN  RHSHOT  SYMY    YVAL    TIMESP
PATCH   1        11      12                      1
PATCH   2        21      22                      1
PATCH   3        31      32                      1
PATCH   4        41      42                      1
PATCH   5        51      52                      1
PATCH   6        61      62                      1
PATCH   7        71      72                      1
PATCH   8        81      82                      1
PATCH   9        91      92                      1
PATCH   10       101     102                     1
PATCH   11       111     112                     1
PATCH   12       121     122                     1
PATCH   13       131     132                     1
PATCH   14       141     142                     1
$
$DESVAR ID      NE      ME
DESVAR  1        3       3                                              CONT
CONT    4        8      11                                              CONT
```

```
CONT    364     328     371                                             CONT
CONT    764     768     771
DESVAR  2        3       3                                              CONT
CONT    884     888     891                                             CONT
CONT    1164    1208    1211                                            CONT
CONT    1444    1448    1451
DESVAR  3        3       3                                              CONT
CONT    17      24      29                                              CONT
CONT    97      264     229                                             CONT
CONT    457     464     469
DESVAR  4        3       3                                              CONT
CONT    497     504     509                                             CONT
CONT    697     664     669                                             CONT
CONT    897     904     909
DESVAR  5        3       3                                              CONT
CONT    937     944     949                                             CONT
CONT    1377    1304    1269                                            CONT
CONT    1457    1464    1469
DESVAR  6        2       2                                              CONT
CONT    30      40                                                      CONT
CONT    190     200
DESVAR  7        3       2                                              CONT
CONT    230     235     240                                             CONT
CONT    470     475     480
DESVAR  8        3       3                                              CONT
CONT    510     513     516                                             CONT
CONT    670     673     676                                             CONT
CONT    830     833     836
DESVAR  9        3       4                                              CONT
CONT    870     873     876                                             CONT
CONT    910     913     916                                             CONT
CONT    950     953     956                                             CONT
CONT    990     993     996
DESVAR  10       3       3                                              CONT
CONT    1476    1473    1470                                            CONT
CONT    1236    1233    1270                                            CONT
CONT    1036    1033    1030
DESVAR  11       3       2                                              CONT
CONT    877     677     517                                             CONT
CONT    880     680     520
DESVAR  12       3       2                                              CONT
CONT    1000    1240    1480                                            CONT
CONT    997     1237    1477
DESVAR  13       3       3                                              CONT
CONT    12      14      16                                              CONT
CONT    372     214     136                                             CONT
CONT    772     774     776
DESVAR  14       3       3                                              CONT
CONT    892     894     896                                             CONT
CONT    1212    1214    1376                                            CONT
CONT    1452    1454    1456
$
TIMESP  1       100.    200.    300.    400.    500.    600.    700.    CONT
CONT    800.    900.    1000.   1100.
$                  PANEL LIST PART
PANLST2     11                4       5       6       7       8       9+CON
+CON          10      11      44      45      46      47      48      49+CON
+CON          50      51      84      85      86      87      88      89+CON
+CON          90      91     124     125     126     127     128     129+CON
+CON         130     131     164     165     166     167     168     169+CON
+CON         170     171     204     205     206     207     208     209+CON
+CON         210     211     244     245     246     247     248     249+CON
+CON         250     251     284     285     286     287     288     289+CON
+CON         290     291     324     325     326     327     328     329+CON
+CON         330     331     364     365     366     367     368     369+CON
+CON         370     371     404     405     406     407     408     409+CON
+CON         410     411     444     445     446     447     448     449+CON
+CON         450     451     484     485     486     487     488     489+CON
+CON         490     491     524     525     526     527     528     529+CON
+CON         530     531     564     565     566     567     568     569+CON
+CON         570     571     604     605     606     607     608     609+CON
```

```
+CON         610     611     644     645     646     647     648     649+CON
+CON         650     651     684     685     686     687     688     689+CON
+CON         690     691     724     725     726     727     728     729+CON
+CON         730     731     764     765     766     767     768     769+CON
+CON         770     771
PANLST2 12              4       8       11      364     328     371     CONT
CONT    764     768     771
PANLST2     21              884     885     886     887     888     889+CON
+CON         890     891     924     925     926     927     928     929+CON
+CON         930     931     964     965     966     967     968     969+CON
+CON         970     971    1004    1005    1006    1007    1008    1009+CON
+CON        1010    1011    1044    1045    1046    1047    1048    1049+CON
+CON        1050    1051    1084    1085    1086    1087    1088    1089+CON
+CON        1090    1091    1124    1125    1126    1127    1128    1129+CON
+CON        1130    1131    1164    1165    1166    1167    1168    1169+CON
+CON        1170    1171    1204    1205    1206    1207    1208    1209+CON
+CON        1210    1211    1244    1245    1246    1247    1248    1249+CON
+CON        1250    1251    1284    1285    1286    1287    1288    1289+CON
+CON        1290    1291    1324    1325    1326    1327    1328    1329+CON
+CON        1330    1331    1364    1365    1366    1367    1368    1369+CON
+CON        1370    1371    1404    1405    1406    1407    1408    1409+CON
+CON        1410    1411    1444    1445    1446    1447    1448    1449+CON
+CON        1450    1451
PANLST2 22              884     888     891     1164    1208    1211    CONT
CONT    1444    1448    1451
PANLST2     31              17      18      19      20      21      22+CON
+CON          23      24      25      26      27      28      29      57+CON
+CON          58      59      60      61      62      63      64      65+CON
+CON          66      67      68      69      97      98      99     100+CON
+CON         101     102     103     104     105     106     107     108+CON
+CON         109     137     138     139     140     141     142     143+CON
+CON         144     145     146     147     148     149     177     178+CON
+CON         179     180     181     182     183     184     185     186+CON
+CON         187     188     189     217     218     219     220     221+CON
+CON         222     223     224     225     226     227     228     229+CON
+CON         257     258     259     260     261     262     263     264+CON
+CON         265     266     267     268     269     297     298     299+CON
+CON         300     301     302     303     304     305     306     307+CON
+CON         308     309     337     338     339     340     341     342+CON
+CON         343     344     345     346     347     348     349     377+CON
+CON         378     379     380     381     382     383     384     385+CON
+CON         386     387     388     389     417     418     419     420+CON
+CON         421     422     423     424     425     426     427     428+CON
+CON         429     457     458     459     460     461     462     463+CON
+CON         464     465     466     467     468     469
PANLST2 32                  17      24      29      97      264     229+CON     CONT
+CON         457     464     469
PANLST2     41              497     498     499     500     501     502+CON
+CON         503     504     505     506     507     508     509     537+CON
+CON         538     539     540     541     542     543     544     545+CON
+CON         546     547     548     549     577     578     579     580+CON
+CON         581     582     583     584     585     586     587     588+CON
+CON         589     617     618     619     620     621     622     623+CON
+CON         624     625     626     627     628     629     657     658+CON
+CON         659     660     661     662     663     664     665     666+CON
+CON         667     668     669     697     698     699     700     701+CON
+CON         702     703     704     705     706     707     708     709+CON
+CON         737     738     739     740     741     742     743     744+CON
+CON         745     746     747     748     749     777     778     779+CON
+CON         780     781     782     783     784     785     786     787+CON
+CON         788     789     817     818     819     820     821     822+CON
+CON         823     824     825     826     827     828     829     857+CON
+CON         858     859     860     861     862     863     864     865+CON
+CON         866     867     868     869     897     898     899     900+CON
+CON         901     902     903     904     905     906     907     908+CON
+CON         909
PANLST2 42              497     697     897     501     701     901     CONT
CONT    504     664     904     507     707     907     509     589     CONT
CONT    669     789     909
PANLST2     51              937     938     939     940     941     942+CON
+CON         943     944     945     946     947     948     949     977+CON
```

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+CON         978     979     980     981     982     983     984     985+CON
+CON         986     987     988     989    1017    1018    1019    1020+CON
+CON        1021    1022    1023    1024    1025    1026    1027    1028+CON
+CON        1029    1057    1058    1059    1060    1061    1062    1063+CON
+CON        1064    1065    1066    1067    1068    1069    1097    1098+CON
+CON        1099    1100    1101    1102    1103    1104    1105    1106+CON
+CON        1107    1108    1109    1137    1138    1139    1140    1141+CON
+CON        1142    1143    1144    1145    1146    1147    1148    1149+CON
+CON        1177    1178    1179    1180    1181    1182    1183    1184+CON
+CON        1185    1186    1187    1188    1189    1217    1218    1219+CON
+CON        1220    1221    1222    1223    1224    1225    1226    1227+CON
+CON        1228    1229    1257    1258    1259    1260    1261    1262+CON
+CON        1263    1264    1265    1266    1267    1268    1269    1297+CON
+CON        1298    1299    1300    1301    1302    1303    1304    1305+CON
+CON        1306    1307    1308    1309    1337    1338    1339    1340+CON
+CON        1341    1342    1343    1344    1345    1346    1347    1348+CON
+CON        1349    1377    1378    1379    1380    1381    1382    1383+CON
+CON        1384    1385    1386    1387    1388    1389    1417    1418+CON
+CON        1419    1420    1421    1422    1423    1424    1425    1426+CON
+CON        1427    1428    1429    1457    1458    1459    1460    1461+CON
+CON        1462    1463    1464    1465    1466    1467    1468    1469
PANLST2 52              937          944     949    1377    1304    1269+CON
+CON        1457    1464    1469
PANLST2     61               30      31      32      33      34      35+CON
+CON          36      37      38      39      40      70      71      72+CON
+CON          73      74      75      76      77      78      79      80+CON
+CON         110     111     112     113     114     115     116     117+CON
+CON         118     119     120     150     151     152     153     154+CON
+CON         155     156     157     158     159     160     190     191+CON
+CON         192     193     194     195     196     197     198     199+CON
+CON         200
PANLST2      62              30              40     190     200
PANLST2      71             230     231     232     233     234     235+CON
+CON         236     237     238     239     240     270     271     272+CON
+CON         273     274     275     276     277     278     279     280+CON
+CON         310     311     312     313     314     315     316     317+CON
+CON         318     319     320     350     351     352     353     354+CON
+CON         355     356     357     358     359     360     390     391+CON
+CON         392     393     394     395     396     397     398     399+CON
+CON         400     430     431     432     433     434     435     436+CON
+CON         437     438     439     440     470     471     472     473+CON
+CON         474     475     476     477     478     479     480
PANLST2      72             230     350     470     312     392     235     CONT
CONT        355     475     238     358     478     240     360     480
PANLST2      81             510     511     512     513     514     515+CON
+CON         516     550     551     552     553     554     555     556+CON
+CON         590     591     592     593     594     595     596     630+CON
+CON         631     632     633     634     635     636     670     671+CON
+CON         672     673     674     675     676     710     711     712+CON
+CON         713     714     715     716     750     751     752     753+CON
+CON         754     755     756     790     791     792     793     794+CON
+CON         795     796     830     831     832     833     834     835+CON
+CON         836
PANLST2 82              510     590     670     750     830    512     CONT
CONT    632     752     832     513     673     833     514    634     CONT
CONT    754     834     635     715     795     516     596    676     CONT
CONT    756     836
PANLST2     91              870     871     872     873     874     875+CON
+CON         876     910     911     912     913     914     915     916+CON
+CON         950     951     952     953     954     955     956     990+CON
+CON         991     992     993     994     995     996
PANLST2 92              870     910     950     990     871    951     CONT
CONT    912     992     873     913     953     993     874    954     CONT
CONT    915     995     876     916     956     996
PANLST2     101            1030    1031    1032    1033    1034    1035+CON
+CON        1036    1070    1071    1072    1073    1074    1075    1076+CON
+CON        1110    1111    1112    1113    1114    1115    1116    1150+CON
+CON        1151    1152    1153    1154    1155    1156    1190    1191+CON
+CON        1192    1193    1194    1195    1196    1230    1231    1232+CON
+CON        1233    1234    1235    1236    1270    1271    1272    1273+CON
+CON        1274    1275    1276    1310    1311    1312    1313    1314+CON
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+CON        1315    1316    1350    1351    1352    1353    1354    1355+CON
+CON        1356    1390    1391    1392    1393    1394    1395    1396+CON
+CON        1430    1431    1432    1433    1434    1435    1436    1470+CON
+CON        1471    1472    1473    1474    1475    1476
PANLST2 102             1476        1473    1470    1236    1233    1270+CON
+CON    1036    1033    1030
PANLST2     111             517     518     519     520     557     558+CON
+CON         559     560     597     598     599     600     637     638+CON
+CON         639     640     677     678     679     680     717     718+CON
+CON         719     720     757     758     759     760     797     798+CON
+CON         799     800     837     838     839     840     877     878+CON
+CON         879     880
PANLST2 112             877     677     517      838     758    598     CONT
CONT    719     639     880     760     680      600     520
PANLST2     121             997     998     999    1000    1037    1038+CON
+CON        1039    1040    1077    1078    1079    1080    1117    1118+CON
+CON        1119    1120    1157    1158    1159    1160    1197    1198+CON
+CON        1199    1200    1237    1238    1239    1240    1277    1278+CON
+CON        1279    1280    1317    1318    1319    1320    1357    1358+CON
+CON        1359    1360    1397    1398    1399    1400    1437    1438+CON
+CON        1439    1440    1477    1478    1479    1480
PANLST2 122             1000        1240    1480     997    1237    1477
PANLST2     131              12      13      14      15      16      52+CON
+CON          53      54      55      56      92      93      94      95+CON
+CON          96     132     133     134     135     136     172     173+CON
+CON         174     175     176     212     213     214     215     216+CON
+CON         252     253     254     255     256     292     293     294+CON
+CON         295     296     332     333     334     335     336     372+CON
+CON         373     374     375     376     412     413     414     415+CON
+CON         416     452     453     454     455     456     492     493+CON
+CON         494     495     496     532     533     534     535     536+CON
+CON         572     573     574     575     576     612     613     614+CON
+CON         615     616     652     653     654     655     656     692+CON
+CON         693     694     695     696     732     733     734     735+CON
+CON         736     772     773     774     775     776
PANLST2 132             12      14      16       132     134    372     CONT
CONT    214     136     533     772     774      776
PANLST2 141                     892     893     894     895     896     932+CON
+CON         933     934     935     936     972     973     974     975+CON
+CON         976    1012    1013    1014    1015    1016    1052    1053+CON
+CON        1054    1055    1056    1092    1093    1094    1095    1096+CON
+CON        1132    1133    1134    1135    1136    1172    1173    1174+CON
+CON        1175    1176    1212    1213    1214    1215    1216    1252+CON
+CON        1253    1254    1255    1256    1292    1293    1294    1295+CON
+CON        1296    1332    1333    1334    1335    1336    1372    1373+CON
+CON        1374    1375    1376    1412    1413    1414    1415    1416+CON
+CON        1452    1453    1454    1455    1456
PANLST2 142                      892     894     896    1212    1214    1376+CON
+CON        1452    1454    1456
$TRJLST SETID
TRJLST  1
        1       1.
$TRAJCT TRAJID
$       TIME    MACH    ALTH    AOA     BETA    FORM    FILE1  FILE1
TRAJCT   1        1                                                    CONT
CONT    .00000E0 0.71871.45600E6  4.0000   0.0                        CONT
CONT    .16000E2 0.98944.41990E6 14.0000                             CONT
CONT    .33000E2 1.34826.43688E6  9.4208                             CONT
CONT    .49000E2 1.63429.58196E6  3.6000                             CONT
CONT    .68000E2 2.17754.82141E6  3.6000        TECPLOT CPTEMP1.PLT  CONT
CONT    .88000E2 2.99306.11358E7  3.6000                             CONT
CONT    .10800E3 4.03065.14897E7  3.6000                             CONT
CONT    .12800E3 5.30536.18668E7  3.6000                             CONT
CONT    .14700E3 7.18387.22489E7  8.7000                             CONT
CONT    .16500E3 8.14718.26307E7 10.2250                             CONT
CONT    .18500E3 8.48577.29382E7 10.2250                             CONT
CONT    .20500E3 8.73075.31108E7 10.2250                             CONT
CONT    .22500E3 8.80061.31479E7 10.2250        TECPLOT CPTEMP2.PLT  CONT
CONT    .24500E3 8.62765.30495E7 10.2250                             CONT
CONT    .26300E3 8.35804.28476E7 30.0000                             CONT
CONT    .28300E3 7.92715.25083E7 30.0000                             CONT
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CONT    .30300E3 7.42020.20828E7 30.0000                              CONT
CONT    .32300E3 6.98630.17006E7 30.0000                              CONT
CONT    .34100E3 6.51451.15705E7 17.6576                              CONT
CONT    .35900E3 6.29482.15555E7 11.3822                              CONT
CONT    .37900E3 6.12626.15505E7 11.5945                              CONT
CONT    .39900E3 5.96248.15405E7 11.6852                              CONT
CONT    .41900E3 5.80340.15256E7 11.6316                              CONT
CONT    .43900E3 5.64886.15063E7 11.4712                              CONT
CONT    .45900E3 5.49856.14827E7 11.2120                              CONT
CONT    .47900E3 5.35216.14551E7 10.8676                              CONT
CONT    .49900E3 5.20938.14237E7 10.4565                              CONT
CONT    .51900E3 5.06993.13890E7  9.9883                              CONT
CONT    .53900E3 4.92935.13511E7  9.3991                              CONT
CONT    .55900E3 4.78106.13103E7  8.7931                              CONT
CONT    .57900E3 4.62119.12670E7  8.2187                              CONT
CONT    .59900E3 4.44764.12216E7  7.6847                              CONT
CONT    .61900E3 4.25902.11747E7  7.2020                              CONT
CONT    .63900E3 4.05448.11267E7  6.7771                              CONT
CONT    .65900E3 3.82413.10782E7  6.3472                              CONT
CONT    .67900E3 3.56631.10300E7  5.9874                              CONT
CONT    .69900E3 3.28723.98254E6  5.7202                              CONT
CONT    .71759E3 3.00000.93312E6  4.8191                              CONT
CONT    .73600E3 2.68846.87329E6  4.1829                              CONT
CONT    .75600E3 2.29065.80146E6  3.4982        TECPLOT CPTEMP3.PLT   CONT
CONT    .77600E3 1.86649.72891E6  3.0646                              CONT
CONT    .79600E3 1.47000.66074E6  3.0928                              CONT
CONT    .81600E3 1.14676.59940E6  3.3054                              CONT
CONT    .83600E3 0.96665.54315E6  3.8323                              CONT
CONT    .85600E3 0.86983.48792E6  3.8046                              CONT
CONT    .87400E3 0.80178.43914E6  3.9110                              CONT
CONT    .89400E3 0.73186.38870E6  3.9359                              CONT
CONT    .91400E3 0.67432.34157E6  3.9549                              CONT
CONT    .93400E3 0.62713.29712E6  3.9492                              CONT
CONT    .95400E3 0.58784.25488E6  3.9046                              CONT
CONT    .97400E3 0.55190.21464E6  3.8498                              CONT
CONT    .99400E3 0.51899.17633E6  3.8233                              CONT
CONT    .10140E4 0.48941.13984E6  3.8101                              CONT
CONT    .10340E4 0.46307.10502E6  3.8009                              CONT
CONT    .10540E4 0.43975.71741E5  3.7895                              CONT
CONT    .10740E4 0.41915.39891E5  3.7718                              CONT
CONT    .10940E4 0.40098.93915E4  3.7458
$THERMPR|SETID  |TRAJID |TEMP   |HOTWALL|TRANS  |GAS    |EMMS   |       |       |
THERMPR 1       1
ENDDATA
```

Listing 2.2 Control Table File: CTRTABLE.DAT

```
       x34
X34GEO.DAT
      REFC        REFB        REFS        REFX        REFY        REFZ  NO AESURFZ LENGTH UNIT   MASS UNIT
 3.5304E+02  1.0000E+00  1.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00           0        IN         SLIN
      MACH           H       ALPHA        BETA       PRATE       QRATE       RRATE          CD          CY          CL          CR          CM          CN        FILE
 2.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  2.5971E+02  1.1602E-01  1.2856E+03  2.2528E+01 -1.9837E+03  1.1244E+02FLOW0001
 5.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.8918E+02  9.6770E-02  2.5032E+02  1.3082E+01 -3.4913E+02  1.6662E+01FLOW0002
 8.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3088E+02 -6.7181E-02  4.9015E+01  2.9096E+00 -8.6678E+01 -7.0483E+01FLOW0003
 1.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1144E+02 -5.2407E-03  2.1355E+00 -4.9772E+00 -2.3302E+01 -7.0093E+01FLOW0004
 2.0000E+00  0.0000E+00  6.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  7.8518E+02 -2.9855E-03  3.7191E+03 -3.5291E+01 -5.2433E+03 -2.3716E+02FLOW0005
 5.0000E+00  0.0000E+00  6.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  4.0816E+02 -6.1486E-02  1.3824E+03 -5.6704E+00 -1.7868E+03 -5.5305E+01FLOW0006
 8.0000E+00  0.0000E+00  6.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  2.8599E+02 -6.2833E-02  9.1603E+02  1.6343E+01 -1.1621E+03  8.1746E+01FLOW0007
 1.0000E+01  0.0000E+00  6.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  2.4852E+02 -1.2351E-01  7.8300E+02  9.6804E+00 -9.9199E+02  3.7729E+01FLOW0008
 2.0000E+00  0.0000E+00  1.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.5174E+03 -1.6332E-01  5.6952E+03 -1.6031E+01 -7.8650E+03 -6.1242E+00FLOW0009
 5.0000E+00  0.0000E+00  1.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  8.0470E+02  9.1895E-02  2.4413E+03 -2.1299E+01 -3.1370E+03 -4.4375E+01FLOW0010
 8.0000E+00  0.0000E+00  1.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  6.2852E+02  1.2834E-01  1.8609E+03 -1.4201E+01 -2.3479E+03 -7.8944E+01FLOW0011
 1.0000E+01  0.0000E+00  1.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  5.7887E+02  5.0929E-02  1.7072E+03  1.7552E+00 -2.1484E+03  2.9509E+01FLOW0012
 2.0000E+00  0.0000E+00  1.3000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  2.3185E+03  3.8880E-01  7.3680E+03 -1.4669E+01 -1.0115E+04 -1.8894E+02FLOW0013
 5.0000E+00  0.0000E+00  1.3000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2761E+03  8.7641E-02  3.4106E+03 -8.0276E+00 -4.4080E+03  4.3439E+00FLOW0014
 8.0000E+00  0.0000E+00  1.3000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0588E+03  5.9525E-02  2.7412E+03 -1.5185E+01 -3.4947E+03 -6.1061E+01FLOW0015
 1.0000E+01  0.0000E+00  1.3000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0023E+03 -7.1151E-03  2.5694E+03 -1.6480E+01 -3.2695E+03 -3.8253E+01FLOW0016
 2.0000E+00  0.0000E+00  1.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  2.9814E+03  2.7379E-01  8.5476E+03 -4.3778E+01 -1.1731E+04 -2.0354E+02FLOW0017
 5.0000E+00  0.0000E+00  1.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.6861E+03  1.4423E-01  4.1220E+03 -4.0398E+01 -5.3717E+03 -1.2500E+02FLOW0018
 8.0000E+00  0.0000E+00  1.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.4436E+03  1.1365E-01  3.4030E+03 -2.0456E+01 -4.3903E+03 -6.5669E+01FLOW0019
 1.0000E+01  0.0000E+00  1.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3816E+03  3.9231E-02  3.2250E+03 -4.2597E+00 -4.1546E+03 -1.8969E+01FLOW0020
 2.0000E+00  0.0000E+00  1.7000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  3.7591E+03  8.5554E-02  9.7522E+03 -8.6507E+01 -1.3417E+04 -2.3777E+02FLOW0021
 5.0000E+00  0.0000E+00  1.7000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  2.1782E+03 -2.2946E-01  4.8740E+03 -2.8204E+01 -6.4238E+03 -5.5987E+01FLOW0022
 8.0000E+00  0.0000E+00  1.7000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.9113E+03  1.4939E-01  4.1188E+03  5.1365E+00 -5.3930E+03  1.4042E+01FLOW0023
 1.0000E+01  0.0000E+00  1.7000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.8496E+03 -9.7600E-02  3.9363E+03 -3.5324E+00 -5.1514E+03 -1.7168E+00FLOW0024
 2.0000E+00  0.0000E+00  1.9000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  4.6396E+03  1.0683E-01  1.0962E+04  3.3051E+01 -1.5148E+04  1.5280E+02FLOW0025
 5.0000E+00  0.0000E+00  1.9000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  2.7557E+03 -3.0816E-01  5.6608E+03 -3.5047E+01 -7.5652E+03 -6.7133E+01FLOW0026
 8.0000E+00  0.0000E+00  1.9000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  2.4678E+03 -3.0344E-01  4.8835E+03 -3.2857E+01 -6.5041E+03 -6.1254E+01FLOW0027
 1.0000E+01  0.0000E+00  1.9000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  2.3998E+03 -1.9447E-01  4.7007E+03 -3.4573E+01 -6.2596E+03 -8.0948E+01FLOW0028
 2.0000E+00  0.0000E+00  2.1000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  5.6261E+03 -2.1284E-01  1.2155E+04 -9.6128E+00 -1.6907E+04  3.0757E+01FLOW0029
 5.0000E+00  0.0000E+00  2.1000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  3.4249E+03 -2.3558E-01  6.4773E+03 -5.8812E+01 -8.7988E+03 -1.3136E+02FLOW0030
 8.0000E+00  0.0000E+00  2.1000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  3.1162E+03 -3.2293E-01  5.6901E+03 -3.3240E+01 -7.7227E+03 -5.5800E+01FLOW0031
 1.0000E+01  0.0000E+00  2.1000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  3.0490E+03 -3.3931E-01  5.5058E+03 -2.6300E+01 -7.4773E+03 -3.8145E+01FLOW0032
 2.0000E+00  0.0000E+00  2.2000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  6.1573E+03 -4.3968E-01  1.2739E+04  5.9828E+01 -1.7792E+04  1.8726E+02FLOW0033
 5.0000E+00  0.0000E+00  2.2000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  3.7948E+03 -2.7060E-01  6.8953E+03 -4.6059E+01 -9.4507E+03 -6.9103E+01FLOW0034
 8.0000E+00  0.0000E+00  2.2000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  3.4797E+03 -2.1134E-01  6.1058E+03 -2.4791E+01 -8.3723E+03 -5.1720E+01FLOW0035
 1.0000E+01  0.0000E+00  2.2000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  3.4560E+03 -1.7696E-01  5.9963E+03 -2.7686E+01 -8.2259E+03 -5.7063E+01FLOW0036
 2.0000E+00  0.0000E+00  2.3000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  6.7155E+03 -3.4836E-01  1.3311E+04  1.2586E+02 -1.8679E+04  3.2436E+02FLOW0037
 5.0000E+00  0.0000E+00  2.3000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  4.1909E+03 -2.8535E-01  7.3182E+03 -5.2430E+01 -1.0127E+04 -8.1873E+01FLOW0038
 8.0000E+00  0.0000E+00  2.3000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  3.8666E+03 -2.7357E-01  6.5295E+03 -4.9447E+01 -9.0478E+03 -9.2834E+01FLOW0039
 1.0000E+01  0.0000E+00  2.3000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  3.8679E+03 -2.3708E-01  6.4628E+03 -1.4987E+01 -8.9589E+03 -1.9927E+01FLOW0040
 2.0000E+00  0.0000E+00  2.4000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  7.2942E+03 -1.3677E-01  1.3869E+04  1.8508E+01 -1.9565E+04  4.2725E+01FLOW0041
 5.0000E+00  0.0000E+00  2.4000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  4.6102E+03 -3.4078E-01  7.7461E+03 -4.5023E+01 -1.0826E+04 -6.4207E+01FLOW0042
 8.0000E+00  0.0000E+00  2.4000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  4.2776E+03 -2.3784E-01  6.9600E+03 -5.5822E+01 -9.7491E+03 -1.0107E+02FLOW0043
 1.0000E+01  0.0000E+00  2.4000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  4.3428E+03 -9.0526E-02  6.9818E+03 -4.4370E+01 -9.7856E+03 -9.0565E+01FLOW0044
 2.0000E+00  0.0000E+00  2.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  7.8908E+03 -1.8434E-01  1.4413E+04  5.9635E+01 -2.0449E+04  8.2965E+01FLOW0045
 5.0000E+00  0.0000E+00  2.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  5.0582E+03 -2.2518E-01  8.1759E+03 -8.2120E+01 -1.1548E+04 -1.2356E+02FLOW0046
 8.0000E+00  0.0000E+00  2.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  4.7164E+03 -3.0683E-01  7.3943E+03 -5.3020E+01 -1.0475E+04 -8.5163E+01FLOW0047
 1.0000E+01  0.0000E+00  2.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  4.8318E+03 -2.2971E-01  7.4846E+03 -2.1001E+01 -1.0611E+04 -1.8142E+01FLOW0048
 2.0000E+00  0.0000E+00  2.6000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  8.5157E+03 -2.0546E-01  1.4935E+04  7.1177E+01 -2.1329E+04  1.8462E+02FLOW0049
 5.0000E+00  0.0000E+00  2.6000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  5.5285E+03 -1.3129E-01  8.6092E+03 -6.2689E+01 -1.2293E+04 -1.0709E+02FLOW0050
 8.0000E+00  0.0000E+00  2.6000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  5.1813E+03 -3.4925E-01  7.8318E+03 -3.0767E+01 -1.1225E+04 -1.9067E+01FLOW0051
 1.0000E+01  0.0000E+00  2.6000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  5.3904E+03 -2.7145E-01  8.0523E+03 -2.1990E+01 -1.1548E+04 -1.7030E+01FLOW0052
 2.0000E+00  0.0000E+00  2.7000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  9.1543E+03 -2.3410E-01  1.5438E+04  1.3269E+02 -2.2203E+04  2.5826E+02FLOW0053
 5.0000E+00  0.0000E+00  2.7000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  6.0285E+03 -1.9345E-01  9.0415E+03 -5.5868E+01 -1.3060E+04 -6.7564E+01FLOW0054
 8.0000E+00  0.0000E+00  2.7000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  5.6722E+03 -7.6230E-02  8.2706E+03 -7.4315E+00 -1.1999E+04  4.6491E+00FLOW0055
 1.0000E+01  0.0000E+00  2.7000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  5.9322E+03 -1.0883E-01  8.5543E+03 -1.6599E+01 -1.2417E+04 -8.8851E+00FLOW0056
 2.0000E+00  0.0000E+00  2.8000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  9.8153E+03 -8.0966E-02  1.5916E+04  3.5054E+01 -2.3069E+04  4.7072E+01FLOW0057
 5.0000E+00  0.0000E+00  2.8000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  6.5521E+03 -1.3428E-01  9.4742E+03 -2.6375E+01 -1.3849E+04 -1.9936E+01FLOW0058
 8.0000E+00  0.0000E+00  2.8000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  6.1888E+03 -1.2491E-01  8.7098E+03 -3.8390E+01 -1.2794E+04 -3.9873E+01FLOW0059
 1.0000E+01  0.0000E+00  2.8000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  6.5725E+03 -3.5808E-01  9.1479E+03 -6.1346E+01 -1.3444E+04 -1.0509E+02FLOW0060
 2.0000E+00  0.0000E+00  2.9000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0494E+04 -1.2561E-01  1.6371E+04 -7.8514E-01 -2.3927E+04  9.8578E+00FLOW0061
 5.0000E+00  0.0000E+00  2.9000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  7.1043E+03 -6.8786E-02  9.9039E+03 -4.3480E+01 -1.4659E+04 -6.6512E+01FLOW0062
 8.0000E+00  0.0000E+00  2.9000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  6.7328E+03 -1.8545E-01  9.1468E+03 -4.8626E+01 -1.3610E+04 -7.6041E+01FLOW0063
 1.0000E+01  0.0000E+00  2.9000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  7.2670E+03 -3.5008E-01  9.7635E+03 -7.6982E+01 -1.4534E+04 -1.1607E+02FLOW0064
 2.0000E+00  0.0000E+00  3.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1184E+04 -2.2838E-01  1.6801E+04  7.3993E+01 -2.4774E+04  1.4373E+02FLOW0065
 5.0000E+00  0.0000E+00  3.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  7.6819E+03 -9.0311E-02  1.0330E+04 -3.2204E+01 -1.5488E+04 -3.5260E+01FLOW0066
 8.0000E+00  0.0000E+00  3.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  7.3035E+03 -1.2248E-01  9.5798E+03 -2.7172E+01 -1.4445E+04 -4.0729E+01FLOW0067
 1.0000E+01  0.0000E+00  3.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  7.8648E+03  2.5458E-03  1.0214E+04  3.3719E+00 -1.5411E+04  1.9123E+01FLOW0068
```

Listing 2.3 ZONAIR Solution File: FLOWi

(Only SHOWS a part of the file:FLOW0001)

```
      8    1517       2       1UVWCP   1P,5E16.9
      1       1    1517
1.150000095E-02 1.140511036E-02 1.132160425E-02 1.121962070E-02 1.105749607E-02
1.089066267E-02 1.077836752E-02 1.073867083E-02 1.065516472E-02 1.057207584E-02
1.048821211E-02 1.036757231E-02 1.022005081E-02 1.008641720E-02 9.999334812E-03
9.904801846E-03 9.859919548E-03 9.840309620E-03 9.849429131E-03 9.877979755E-03
9.944975376E-03 1.000589132E-02 1.011049747E-02 1.019603014E-02 1.032245159E-02
1.042270660E-02 1.055079699E-02 1.064944267E-02 1.077854633E-02 1.086717844E-02
1.098191738E-02 1.109087467E-02 1.118260622E-02 1.131749153E-02 1.140522957E-02
1.152062416E-02 1.162308455E-02 1.880591512E-01 5.838843584E-01 6.542179585E-01
7.061549425E-01 7.146614790E-01 7.447183132E-01 7.901023030E-01 8.390808105E-01
8.730966449E-01 9.076566100E-01 9.487354159E-01 9.835487604E-01 1.006986380E+00
1.008331299E+00 1.006821990E+00 1.004812598E+00 1.003581643E+00 1.002487421E+00
1.001138330E+00 9.997241497E-01 9.982998967E-01 9.969612360E-01 9.956729412E-01
9.937891364E-01 9.904270172E-01 9.793742895E-01 9.647903442E-01 9.368254542E-01
9.624013305E-01 9.840826988E-01 9.933591485E-01 9.941143394E-01 9.920565486E-01
9.880259037E-01 9.839264750E-01 9.785641432E-01 9.730243683E-01 9.706261754E-01
9.708256125E-01 1.842476130E-01 5.871124268E-01 6.608607769E-01 7.153767347E-01
7.255337238E-01 7.545754910E-01 7.968451977E-01 8.422437906E-01 8.746673465E-01
9.087353349E-01 9.489182234E-01 9.833953977E-01 1.007111669E+00 1.008789062E+00
1.007765889E+00 1.005286932E+00 1.003811717E+00 1.002603292E+00 1.001195073E+00
9.997171164E-01 9.982233644E-01 9.968002439E-01 9.953713417E-01 9.932277799E-01
9.891459346E-01 9.746640325E-01 9.561899900E-01 9.458277225E-01 9.776141047E-01
9.819965959E-01 9.884859324E-01 9.903964400E-01 9.897170663E-01 9.864318371E-01
9.822987318E-01 9.773539305E-01 9.730015397E-01 9.713451862E-01 9.720214605E-01
1.796302795E-01 5.956581831E-01 6.749228239E-01 7.334580421E-01 7.463179827E-01
7.728921175E-01 8.086600304E-01 8.474841118E-01 8.774371147E-01 9.104853868E-01
9.492449760E-01 9.836050868E-01 1.008475900E+00 1.010414124E+00 1.009422660E+00
1.006248116E+00 1.004243612E+00 1.002699733E+00 1.001067042E+00 9.994227886E-01
9.978445768E-01 9.963071942E-01 9.946020246E-01 9.919366241E-01 9.857097268E-01
9.650292397E-01 9.372574091E-01 9.621667862E-01 9.900720716E-01 9.828918576E-01
9.835166335E-01 9.858148098E-01 9.863718748E-01 9.837318659E-01 9.796878099E-01
9.756025672E-01 9.733114243E-01 9.725309610E-01 9.736052155E-01 1.759050488E-01
6.072666645E-01 6.957823634E-01 7.585780621E-01 7.739935517E-01 7.965505719E-01
8.234789968E-01 8.541157842E-01 8.813187480E-01 9.129451513E-01 9.497613311E-01
9.841253161E-01 1.010330677E+00 1.011736155E+00 1.011105895E+00 1.006242394E+00
1.004149795E+00 1.002249002E+00 1.000118375E+00 9.980610013E-01 9.964712262E-01
9.949423075E-01 9.925972819E-01 9.895277619E-01 9.629009366E-01 9.473243356E-01
9.470250607E-01 9.689650536E-01 9.964454770E-01 9.845929742E-01 9.801405072E-01
9.813674688E-01 9.821187258E-01 9.796665907E-01 9.761662483E-01 9.736321568E-01
9.731714129E-01 9.742046595E-01 9.760769010E-01 1.722726822E-01 6.257183552E-01
7.216252685E-01 7.862826586E-01 8.012615442E-01 8.188865185E-01 8.379235268E-01
8.613127470E-01 8.861841559E-01 9.161065817E-01 9.505614638E-01 9.848192334E-01
1.012182474E+00 1.015373349E+00 1.011377096E+00 1.005218625E+00 1.001589417E+00
9.989039302E-01 9.957264662E-01 9.933863282E-01 9.926827550E-01 9.917639494E-01
9.895175695E-01 9.845592380E-01 9.481958151E-01 9.493101835E-01 9.481427670E-01
9.520943165E-01 9.933207035E-01 9.848185778E-01 9.796236157E-01 9.777052999E-01
9.761855602E-01 9.726880789E-01 9.707157016E-01 9.713155627E-01 9.739511013E-01
9.782418609E-01 9.818547368E-01 2.673266530E-01 6.437313557E-01 7.438955307E-01
8.017773628E-01 8.083698750E-01 8.254590631E-01 8.457258940E-01 8.675575256E-01
8.909239769E-01 9.192523956E-01 9.515301585E-01 9.854063392E-01 1.015280485E+00
1.018214583E+00 1.008628964E+00 9.996929169E-01 9.937810898E-01 9.911296368E-01
9.887862802E-01 9.868136644E-01 9.864090681E-01 9.861422777E-01 9.861439466E-01
9.823170304E-01 9.395450354E-01 9.401900768E-01 9.388117790E-01 9.414085746E-01
9.898036718E-01 9.851907492E-01 9.800323248E-01 9.732031822E-01 9.666030407E-01
9.620573521E-01 9.648018479E-01 9.725078940E-01 9.808517098E-01 9.905855656E-01
9.976239800E-01 2.656051517E-01 6.552308798E-01 7.544271350E-01 8.031817079E-01
8.091089129E-01 8.274910450E-01 8.489109874E-01 8.714590073E-01 8.941684961E-01
9.213668704E-01 9.522858262E-01 9.857733250E-01 1.017475605E+00 1.016373158E+00
1.007329822E+00 9.956530929E-01 9.875182509E-01 9.855720997E-01 9.839847088E-01
9.827306867E-01 9.822531343E-01 9.839258790E-01 9.845170975E-01 9.828985333E-01
9.573778510E-01 9.403241873E-01 9.369202256E-01 9.389562011E-01 9.907082915E-01
9.848684072E-01 9.784495831E-01 9.692220688E-01 9.610980153E-01 9.588758945E-01
9.656986594E-01 9.775320292E-01 9.887018204E-01 1.000593543E+00 1.009607434E+00
2.645147443E-01 6.630335450E-01 7.587661147E-01 8.035624027E-01 8.097686768E-01
8.288719654E-01 8.509948254E-01 8.739618659E-01 8.966889381E-01 9.229714274E-01
9.528748989E-01 9.860221148E-01 1.015993476E+00 1.015883565E+00 1.001769423E+00
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9.803133607E-01 9.815260768E-01 9.825364351E-01 9.820158482E-01 9.710224271E-01
9.563409686E-01 9.357023239E-01 9.298430085E-01 9.861710668E-01 9.836721420E-01
9.769240022E-01 9.664419293E-01 9.594875574E-01 9.616473317E-01 9.715756774E-01
9.854689837E-01 9.976852536E-01 1.010178804E+00 1.019460201E+00 2.634603977E-01
6.706559658E-01 7.610845566E-01 8.039669991E-01 8.104826212E-01 8.302269578E-01
8.530099392E-01 8.763681054E-01 8.991518617E-01 9.250707626E-01 9.535861015E-01
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9.804241061E-01 9.810521007E-01 9.787678123E-01 9.781800508E-01 9.787878990E-01
9.795915484E-01 9.804303050E-01 9.804300070E-01 9.789170623E-01 9.714579582E-01
9.597719908E-01 9.468085170E-01 9.722892046E-01 9.780606031E-01 9.728713632E-01
9.641922116E-01 9.621061683E-01 9.707278609E-01 9.830245376E-01 9.972735047E-01
1.008887887E+00 1.020312905E+00 1.028226972E+00 2.624474764E-01 6.777455211E-01
7.625910044E-01 8.043749332E-01 8.112152815E-01 8.315420747E-01 8.549509048E-01
8.786753416E-01 9.014780521E-01 9.273527861E-01 9.548567533E-01 9.863723516E-01
1.014573455E+00 1.012866974E+00 9.934547544E-01 9.838056564E-01 9.781806469E-01
9.797362089E-01 9.768028259E-01 9.769212604E-01 9.782124162E-01 9.788131118E-01
9.793426991E-01 9.797393084E-01 9.797351956E-01 9.771769643E-01 9.713317752E-01
9.595692158E-01 9.646176696E-01 9.711627960E-01 9.674632549E-01 9.646335840E-01
9.692843556E-01 9.829280376E-01 9.954526424E-01 1.007951021E+00 1.017617106E+00
1.024639726E+00 1.030591369E+00 2.614789009E-01 6.841379404E-01 7.634298801E-01
8.048028946E-01 8.119432330E-01 8.328098059E-01 8.568145037E-01 8.808813095E-01
9.036735296E-01 9.295251966E-01 9.566872120E-01 9.868342280E-01 1.013712049E+00
1.011383533E+00 9.938604832E-01 9.817287326E-01 9.762699604E-01 9.783005714E-01
9.754370451E-01 9.762142897E-01 9.782997370E-01 9.786719680E-01 9.793000221E-01
9.800474048E-01 9.808106422E-01 9.801792502E-01 9.764794111E-01 9.669635892E-01
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9.354104400E-01 9.430304766E-01 9.491220713E-01 9.532597661E-01 9.571623802E-01
9.618468285E-01 9.693559408E-01 9.737514257E-01 9.778344631E-01 9.793643355E-01
9.800754189E-01 9.810358882E-01 9.824125171E-01 9.834718108E-01 9.842513800E-01
9.848587513E-01 9.853280187E-01 9.858110547E-01 9.862993956E-01 9.868785143E-01
9.872430563E-01 9.879682660E-01 9.881807566E-01 9.878913164E-01 9.876585007E-01
9.879104495E-01 9.881703258E-01 9.887239337E-01 9.891213775E-01 9.894325733E-01
9.896788001E-01 9.901158810E-01 9.901031256E-01 1.879945993E-01 7.851480842E-01
8.720778227E-01 8.932347298E-01 9.074687362E-01 9.193948507E-01 9.293124676E-01
9.375307560E-01 9.442318678E-01 9.492032528E-01 9.538211226E-01 9.591982961E-01
9.665606618E-01 9.712858796E-01 9.760069847E-01 9.774189591E-01 9.784337282E-01
9.790607095E-01 9.802194238E-01 9.813896418E-01 9.823279977E-01 9.830521345E-01
9.836075306E-01 9.841722846E-01 9.847244620E-01 9.853591919E-01 9.857457876E-01
9.861247540E-01 9.863772392E-01 9.865998626E-01 9.865072370E-01 9.863042831E-01
9.862453341E-01 9.864752889E-01 9.867689013E-01 9.870619774E-01 9.874168038E-01
9.878953099E-01 9.884675741E-01 1.903625131E-01 7.851607800E-01 8.691626787E-01
8.883771300E-01 9.028825760E-01 9.150769114E-01 9.253020287E-01 9.338479042E-01
9.409101009E-01 9.465101957E-01 9.516713023E-01 9.573431015E-01 9.639170766E-01
9.689506888E-01 9.721978903E-01 9.748326540E-01 9.755412340E-01 9.762183428E-01
9.772936702E-01 9.786379337E-01 9.800062776E-01 9.811446667E-01 9.819744229E-01
9.827261567E-01 9.833981395E-01 9.841223955E-01 9.845499992E-01 9.849595428E-01
9.852252603E-01 9.855128527E-01 9.856032729E-01 9.854689240E-01 9.852622151E-01
9.851133227E-01 9.851846099E-01 9.854490161E-01 9.859018922E-01 9.864359498E-01
9.870029092E-01 1.922508478E-01 7.829319835E-01 8.682240248E-01 8.860796690E-01
9.005278945E-01 9.127599001E-01 9.230960608E-01 9.317917824E-01 9.390413165E-01
9.450211525E-01 9.505037069E-01 9.562638998E-01 9.618216157E-01 9.660903811E-01
9.685582519E-01 9.711869955E-01 9.725303650E-01 9.736613631E-01 9.750694036E-01
9.766735435E-01 9.784179926E-01 9.799663424E-01 9.810803533E-01 9.820228219E-01
9.828082919E-01 9.836052656E-01 9.840635061E-01 9.844948053E-01 9.847672582E-01
9.850720167E-01 9.852545857E-01 9.852259159E-01 9.850113988E-01 9.846118689E-01
9.844665527E-01 9.846503139E-01 9.851785898E-01 9.857985973E-01 9.864415526E-01
4.207676649E-02 4.144012928E-02 4.076701403E-02 4.004353285E-02 3.922158480E-02
3.848284483E-02 3.803020716E-02 3.772085905E-02 3.740942478E-02 3.709489107E-02
3.678220510E-02 3.632402420E-02 3.575998545E-02 3.515738249E-02 3.474771976E-02
3.441327810E-02 3.418260813E-02 3.409445286E-02 3.413468599E-02 3.429150581E-02
3.453403711E-02 3.485882282E-02 3.525209427E-02 3.569960594E-02 3.619986773E-02
3.673422337E-02 3.729069233E-02 3.786003590E-02 3.844159842E-02 3.901946545E-02
3.958940506E-02 4.013943672E-02 4.080557823E-02 4.146063328E-02 4.221755266E-02
4.257190228E-02 4.302090406E-02

- *Output Data Listing*

Listing 2.4 Standard Output File: X34TPS.OUT

E X E C U T I V E C O N T R O L S U M M A R Y

```
|...1...|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|..10...|

ASSIGN AEROBASE='CTRTABLE.DAT',PRINT=0
SOL 1
CEND
```

C A S E C O N T R O L S U M M A R Y

S I N G L E P R E C I S I O N C O M P U T A T I O N

M A X I M U M A L L O C A B L E M E M O R Y = 800 M E G A B Y T E S

```
|...1...|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|..10...|

ECHO = SORT
SUBCASE = 1
SUBTITLE=TPS OPTIMISATION FOR X34
LABEL= HYPERSONIC AERODYNAMIC DATABASE BY ZONAIR
TPSDES=1
BEGIN BULK
```

S O R T E D B U L K D A T A E C H O

```
CARD
COUNT       |...1...|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|..10...|
```

```
 1 -       DESVAR  1       3       3                                                       CONT
 2 -       CONT    4       8       11                                                      CONT
 3 -       CONT    364     328     371                                                     CONT
 4 -       CONT    764     768     771
 5 -       DESVAR  2       3       3                                                       CONT
 6 -       CONT    884     888     891                                                     CONT
 7 -       CONT    1164    1208    1211                                                    CONT
 8 -       CONT    1444    1448    1451
 9 -       DESVAR  3       3       3                                                       CONT
10 -       CONT    17      24      29                                                      CONT
11 -       CONT    97      264     229                                                     CONT
12 -       CONT    457     464     469
13 -       DESVAR  4       3       3                                                       CONT
14 -       CONT    497     504     509                                                     CONT
15 -       CONT    697     664     669                                                     CONT
16 -       CONT    897     904     909
17 -       DESVAR  5       3       3                                                       CONT
18 -       CONT    937     944     949                                                     CONT
19 -       CONT    1377    1304    1269                                                    CONT
20 -       CONT    1457    1464    1469
21 -       DESVAR  6       2       2                                                       CONT
22 -       CONT    30      40                                                              CONT
23 -       CONT    190     200
24 -       DESVAR  7       3       2                                                       CONT
25 -       CONT    230     235     240                                                     CONT
26 -       CONT    470     475     480
27 -       DESVAR  8       3       3                                                       CONT
28 -       CONT    510     513     516                                                     CONT
29 -       CONT    670     673     676                                                     CONT
30 -       CONT    830     833     836
31 -       DESVAR  9       3       4                                                       CONT
32 -       CONT    870     873     876                                                     CONT
33 -       CONT    910     913     916                                                     CONT
34 -       CONT    950     953     956                                                     CONT
35 -       CONT    990     993     996
36 -       DESVAR  10      3       3                                                       CONT
37 -       CONT    1476    1473    1470                                                    CONT
38 -       CONT    1236    1233    1270                                                    CONT
39 -       CONT    1036    1033    1030
40 -       DESVAR  11      3       2                                                       CONT
41 -       CONT    877     677     517                                                     CONT
42 -       CONT    880     680     520
43 -       DESVAR  12      3       2                                                       CONT
44 -       CONT    1000    1240    1480                                                    CONT
45 -       CONT    997     1237    1477
46 -       DESVAR  13      3       3                                                       CONT
47 -       CONT    12      14      16                                                      CONT
48 -       CONT    372     214     136                                                     CONT
49 -       CONT    772     774     776
50 -       DESVAR  14      3       3                                                       CONT
51 -       CONT    892     894     896                                                     CONT
52 -       CONT    1212    1214    1376                                                    CONT
53 -       CONT    1452    1454    1456
54 -       FEM     101                             IN      TECPLOT X34_DYN.DAT     CONT
55 -       CONT    X34_DYN .OUT
56 -       PANLST2 11              4       5       6       7       8       9       +CON
57 -       +CON    10      11      44      45      46      47      48      49      +CON
58 -       +CON    50      51      84      85      86      87      88      89      +CON
59 -       +CON    90      91      124     125     126     127     128     129     +CON
60 -       +CON    130     131     164     165     166     167     168     169     +CON
61 -       +CON    170     171     204     205     206     207     208     209     +CON
62 -       +CON    210     211     244     245     246     247     248     249     +CON
63 -       +CON    250     251     284     285     286     287     288     289     +CON
64 -       +CON    290     291     324     325     326     327     328     329     +CON
65 -       +CON    330     331     364     365     366     367     368     369     +CON
66 -       +CON    370     371     404     405     406     407     408     409     +CON
67 -       +CON    410     411     444     445     446     447     448     449     +CON
68 -       +CON    450     451     484     485     486     487     488     489     +CON
69 -       +CON    490     491     524     525     526     527     528     529     +CON
70 -       +CON    530     531     564     565     566     567     568     569     +CON
71 -       +CON    570     571     604     605     606     607     608     609     +CON
72 -       +CON    610     611     644     645     646     647     648     649     +CON
73 -       +CON    650     651     684     685     686     687     688     689     +CON
74 -       +CON    690     691     724     725     726     727     728     729     +CON
75 -       +CON    730     731     764     765     766     767     768     769     +CON
76 -       +CON    770     771
77 -       PANLST2 12              4       8       11      364     328     371     CONT
78 -       CONT    764     768     771
79 -       PANLST2 21              884     885     886     887     888     889     +CON
80 -       +CON    890     891     924     925     926     927     928     929     +CON
81 -       +CON    930     931     964     965     966     967     968     969     +CON
82 -       +CON    970     971     1004    1005    1006    1007    1008    1009    +CON
83 -       +CON    1010    1011    1044    1045    1046    1047    1048    1049    +CON
84 -       +CON    1050    1051    1084    1085    1086    1087    1088    1089    +CON
85 -       +CON    1090    1091    1124    1125    1126    1127    1128    1129    +CON
86 -       +CON    1130    1131    1164    1165    1166    1167    1168    1169    +CON
87 -       +CON    1170    1171    1204    1205    1206    1207    1208    1209    +CON
88 -       +CON    1210    1211    1244    1245    1246    1247    1248    1249    +CON
89 -       +CON    1250    1251    1284    1285    1286    1287    1288    1289    +CON
90 -       +CON    1290    1291    1324    1325    1326    1327    1328    1329    +CON
91 -       +CON    1330    1331    1364    1365    1366    1367    1368    1369    +CON
92 -       +CON    1370    1371    1404    1405    1406    1407    1408    1409    +CON
93 -       +CON    1410    1411    1444    1445    1446    1447    1448    1449    +CON
94 -       +CON    1450    1451
95 -       PANLST2 22              884     888     891     1164    1208    1211    CONT
```

```
 96 -       CONT    1444    1448    1451
 97 -       PANLST2 31              17      18      19      20      21      22      +CON
 98 -       +CON    23      24      25      26      27      28      29      57      +CON
 99 -       +CON    58      59      60      61      62      63      64      65      +CON
100 -       +CON    66      67      68      69      97      98      99      100     +CON
101 -       +CON    101     102     103     104     105     106     107     108     +CON
102 -       +CON    109     137     138     139     140     141     142     143     +CON
103 -       +CON    144     145     146     147     148     149     177     178     +CON
104 -       +CON    179     180     181     182     183     184     185     186     +CON
105 -       +CON    187     188     189     217     218     219     220     221     +CON
106 -       +CON    222     223     224     225     226     227     228     229     +CON
107 -       +CON    257     258     259     260     261     262     263     264     +CON
108 -       +CON    265     266     267     268     269     297     298     299     +CON
109 -       +CON    300     301     302     303     304     305     306     307     +CON
110 -       +CON    308     309     337     338     339     340     341     342     +CON
111 -       +CON    343     344     345     346     347     348     349     377     +CON
112 -       +CON    378     379     380     381     382     383     384     385     +CON
113 -       +CON    386     387     388     389     417     418     419     420     +CON
114 -       +CON    421     422     423     424     425     426     427     428     +CON
115 -       +CON    429     457     458     459     460     461     462     463     +CON
116 -       +CON    464     465     466     467     468     469
117 -       PANLST2 32              17      24      29      97      264     229     +CON
118 -       +CON    457     464     469
119 -       PANLST2 41              497     498     499     500     501     502     +CON
120 -       +CON    503     504     505     506     507     508     509     537     +CON
121 -       +CON    538     539     540     541     542     543     544     545     +CON
122 -       +CON    546     547     548     549     577     578     579     580     +CON
123 -       +CON    581     582     583     584     585     586     587     588     +CON
124 -       +CON    589     617     618     619     620     621     622     623     +CON
125 -       +CON    624     625     626     627     628     629     657     658     +CON
126 -       +CON    659     660     661     662     663     664     665     666     +CON
127 -       +CON    667     668     669     697     698     699     700     701     +CON
128 -       +CON    702     703     704     705     706     707     708     709     +CON
129 -       +CON    737     738     739     740     741     742     743     744     +CON
130 -       +CON    745     746     747     748     749     777     778     779     +CON
131 -       +CON    780     781     782     783     784     785     786     787     +CON
132 -       +CON    788     789     817     818     819     820     821     822     +CON
133 -       +CON    823     824     825     826     827     828     829     857     +CON
134 -       +CON    858     859     860     861     862     863     864     865     +CON
135 -       +CON    866     867     868     869     897     898     899     900     +CON
136 -       +CON    901     902     903     904     905     906     907     908     +CON
137 -       +CON    909
138 -       PANLST2 42              497     697     897     501     701     901     CONT
139 -       CONT    504     664     904     507     707     907     509     589     CONT
140 -       CONT    669     789     909
141 -       PANLST2 51              937     938     939     940     941     942     +CON
142 -       +CON    943     944     945     946     947     948     949     977     +CON
143 -       +CON    978     979     980     981     982     983     984     985     +CON
144 -       +CON    986     987     988     989     1017    1018    1019    1020    +CON
145 -       +CON    1021    1022    1023    1024    1025    1026    1027    1028    +CON
146 -       +CON    1029    1057    1058    1059    1060    1061    1062    1063    +CON
147 -       +CON    1064    1065    1066    1067    1068    1069    1097    1098    +CON
148 -       +CON    1099    1100    1101    1102    1103    1104    1105    1106    +CON
149 -       +CON    1107    1108    1109    1137    1138    1139    1140    1141    +CON
150 -       +CON    1142    1143    1144    1145    1146    1147    1148    1149    +CON
151 -       +CON    1177    1178    1179    1180    1181    1182    1183    1184    +CON
152 -       +CON    1185    1186    1187    1188    1189    1217    1218    1219    +CON
153 -       +CON    1220    1221    1222    1223    1224    1225    1226    1227    +CON
154 -       +CON    1228    1229    1257    1258    1259    1260    1261    1262    +CON
155 -       +CON    1263    1264    1265    1266    1267    1268    1269    1297    +CON
156 -       +CON    1298    1299    1300    1301    1302    1303    1304    1305    +CON
157 -       +CON    1306    1307    1308    1309    1337    1338    1339    1340    +CON
158 -       +CON    1341    1342    1343    1344    1345    1346    1347    1348    +CON
159 -       +CON    1349    1377    1378    1379    1380    1381    1382    1383    +CON
160 -       +CON    1384    1385    1386    1387    1388    1389    1417    1418    +CON
161 -       +CON    1419    1420    1421    1422    1423    1424    1425    1426    +CON
162 -       +CON    1427    1428    1429    1457    1458    1459    1460    1461    +CON
163 -       +CON    1462    1463    1464    1465    1466    1467    1468    1469
164 -       PANLST2 52              937     944     949     1377    1304    1269    +CON
165 -       +CON    1457    1464    1469
166 -       PANLST2 61              30      31      32      33      34      35      +CON
167 -       +CON    36      37      38      39      40      70      71      72      +CON
168 -       +CON    73      74      75      76      77      78      79      80      +CON
169 -       +CON    110     111     112     113     114     115     116     117     +CON
170 -       +CON    118     119     120     150     151     152     153     154     +CON
171 -       +CON    155     156     157     158     159     160     190     191     +CON
172 -       +CON    192     193     194     195     196     197     198     199     +CON
173 -       +CON    200
174 -       PANLST2 62              30      40      190     200
175 -       PANLST2 71              230     231     232     233     234     235     +CON
176 -       +CON    236     237     238     239     240     270     271     272     +CON
177 -       +CON    273     274     275     276     277     278     279     280     +CON
178 -       +CON    310     311     312     313     314     315     316     317     +CON
179 -       +CON    318     319     320     350     351     352     353     354     +CON
180 -       +CON    355     356     357     358     359     360     390     391     +CON
181 -       +CON    392     393     394     395     396     397     398     399     +CON
182 -       +CON    400     430     431     432     433     434     435     436     +CON
183 -       +CON    437     438     439     440     470     471     472     473     +CON
184 -       +CON    474     475     476     477     478     479     480
185 -       PANLST2 72              230     350     470     312     392     235     CONT
186 -       CONT    355     475     238     358     478     240     360     480
187 -       PANLST2 81              510     511     512     513     514     515     +CON
188 -       +CON    516     550     551     552     553     554     555     556     +CON
189 -       +CON    590     591     592     593     594     595     596     630     +CON
190 -       +CON    631     632     633     634     635     636     670     671     +CON
```

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191 -       +CON    672     673     674     675     676     710     711     712     +CON
192 -       +CON    713     714     715     716     750     751     752     753     +CON
193 -       +CON    754     755     756     790     791     792     793     794     +CON
194 -       +CON    795     796     830     831     832     833     834     835     +CON
195 -       +CON    836
196 -       PANLST2 82              510     590     670     750     830     512     CONT
197 -       CONT    632     752     832     513     673     833     514     634     CONT
198 -       CONT    754     834     635     715     795     516     596     676     CONT
199 -       CONT    756     836
200 -       PANLST2 91              870     871     872     873     874     875     +CON
201 -       +CON    876     910     911     912     913     914     915     916     +CON
202 -       +CON    950     951     952     953     954     955     956     990     +CON
203 -       +CON    991     992     993     994     995     996
204 -       PANLST2 92              870     910     950     990     871     951     CONT
205 -       CONT    912     992     873     913     953     993     874     954     CONT
206 -       CONT    915     995     876     916     956     996
207 -       PANLST2 101             1030    1031    1032    1033    1034    1035    +CON
208 -       +CON    1036    1070    1071    1072    1073    1074    1075    1076    +CON
209 -       +CON    1110    1111    1112    1113    1114    1115    1116    1150    +CON
210 -       +CON    1151    1152    1153    1154    1155    1156    1190    1191    +CON
211 -       +CON    1192    1193    1194    1195    1196    1230    1231    1232    +CON
212 -       +CON    1233    1234    1235    1236    1270    1271    1272    1273    +CON
213 -       +CON    1274    1275    1276    1310    1311    1312    1313    1314    +CON
214 -       +CON    1315    1316    1350    1351    1352    1353    1354    1355    +CON
215 -       +CON    1356    1390    1391    1392    1393    1394    1395    1396    +CON
216 -       +CON    1430    1431    1432    1433    1434    1435    1436    1470    +CON
217 -       +CON    1471    1472    1473    1474    1475    1476
218 -       PANLST2 102             1476    1473    1470    1236    1233    1270    +CON
219 -       +CON    1036    1033    1030
220 -       PANLST2 111             517     518     519     520     557     558     +CON
221 -       +CON    559     560     597     598     599     600     637     638     +CON
222 -       +CON    639     640     677     678     679     680     717     718     +CON
223 -       +CON    719     720     757     758     759     760     797     798     +CON
224 -       +CON    799     800     837     838     839     840     877     878     +CON
225 -       +CON    879     880
226 -       PANLST2 112             877     677     517     838     758     598     CONT
227 -       CONT    719     639     880     760     680     600     520
228 -       PANLST2 121             997     998     999     1000    1037    1038    +CON
229 -       +CON    1039    1040    1077    1078    1079    1080    1117    1118    +CON
230 -       +CON    1119    1120    1157    1158    1159    1160    1197    1198    +CON
231 -       +CON    1199    1200    1237    1238    1239    1240    1277    1278    +CON
232 -       +CON    1279    1280    1317    1318    1319    1320    1357    1358    +CON
233 -       +CON    1359    1360    1397    1398    1399    1400    1437    1438    +CON
234 -       +CON    1439    1440    1477    1478    1479    1480
235 -       PANLST2 122             1000    1240    1480    997     1237    1477
236 -       PANLST2 131             12      13      14      15      16      52      +CON
237 -       +CON    53      54      55      56      92      93      94      95      +CON
238 -       +CON    96      132     133     134     135     136     172     173     +CON
239 -       +CON    174     175     176     212     213     214     215     216     +CON
240 -       +CON    252     253     254     255     256     292     293     294     +CON
241 -       +CON    295     296     332     333     334     335     336     372     +CON
242 -       +CON    373     374     375     376     412     413     414     415     +CON
243 -       +CON    416     452     453     454     455     456     492     493     +CON
244 -       +CON    494     495     496     532     533     534     535     536     +CON
245 -       +CON    572     573     574     575     576     612     613     614     +CON
246 -       +CON    615     616     652     653     654     655     656     692     +CON
247 -       +CON    693     694     695     696     732     733     734     735     +CON
248 -       +CON    736     772     773     774     775     776
249 -       PANLST2 132             12      14      16      132     134     372     CONT
250 -       CONT    214     136     533     772     774     776
251 -       PANLST2 141             892     893     894     895     896     932     +CON
252 -       +CON    933     934     935     936     972     973     974     975     +CON
253 -       +CON    976     1012    1013    1014    1015    1016    1052    1053    +CON
254 -       +CON    1054    1055    1056    1092    1093    1094    1095    1096    +CON
255 -       +CON    1132    1133    1134    1135    1136    1172    1173    1174    +CON
256 -       +CON    1175    1176    1212    1213    1214    1215    1216    1252    +CON
257 -       +CON    1253    1254    1255    1256    1292    1293    1294    1295    +CON
258 -       +CON    1296    1332    1333    1334    1335    1336    1372    1373    +CON
259 -       +CON    1374    1375    1376    1412    1413    1414    1415    1416    +CON
260 -       +CON    1452    1453    1454    1455    1456
261 -       PANLST2 142             892     894     896     1212    1214    1376    +CON
262 -       +CON    1452    1454    1456
263 -       PATCH   1       11      12                      1
264 -       PATCH   2       21      22                      1
265 -       PATCH   3       31      32                      1
266 -       PATCH   4       41      42                      1
267 -       PATCH   5       51      52                      1
268 -       PATCH   6       61      62                      1
269 -       PATCH   7       71      72                      1
270 -       PATCH   8       81      82                      1
271 -       PATCH   9       91      92                      1
272 -       PATCH   10      101     102                     1
273 -       PATCH   11      111     112                     1
274 -       PATCH   12      121     122                     1
275 -       PATCH   13      131     132                     1
276 -       PATCH   14      141     142                     1
277 -       PLTAERO 1       YES     NO              NASTRAN X34SURF.NAS
278 -       PLTTPS  -2      1       ALL     TECPLOT THICK1L .PLT    -4.0
279 -       PLTTPS  1       1       ALL     TECPLOT THICKML .PLT    -4.0
280 -       PRVAL   4               9000000050.0    15.     1.1
281 -       PODRSM  1       1                               SAVE    X34M1.R ST      CONT
282 -       CONT    CPPODRSM.P3D    UPODRSM.P3D     VPODRSM .P3D    WPODRSM .P3D
283 -       STTYPE  21      1       221                                             CONT
284 -       CONT    0.1
285 -       STTYPE  22      1       206                                             CONT
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286 -       CONT    0.5
287 -       STTYPE  23      3       103     103     103                             CONT
288 -       CONT    0.12    0.11    0.095   0.75    0.3
289 -       STTYPE  24      4       114     114     127                             CONT
290 -       CONT    0.08    0.08    0.12    1.0     0.8
291 -       STTYPE  25      1       101                                             CONT
292 -       CONT    0.1
293 -       STTYPE  31      6       221                                             CONT
294 -       CONT    0.08
295 -       STTYPE  32      1       266                                             CONT
296 -       CONT    0.18
297 -       STTYPE  33      6       260                                             CONT
298 -       CONT    2.0
299 -       STTYPE  34      1       266                                             CONT
300 -       CONT    0.11
301 -       STTYPE  35      6       245                                             CONT
302 -       CONT    0.1
303 -       STTYPE  36      1       101                                             CONT
304 -       CONT    0.15
305 -       THERMPR 1       1
306 -       TIMESP  1       100.    200.    300.    400.    500.    600.    700.    CONT
307 -       CONT    800.    900.    1000.   1100.
308 -       TPSDES  1       1       1       2       101                             CONT
309 -       CONT    1       2       3       4       5       6       7       8       CONT
310 -       CONT    9       10      11      12      13      14
311 -       TPSSYM  1       1       4       4                                       CONT
312 -       CONT    1       21      0.08    2.                                      CONT
313 -       CONT    1       23      0.3     1.5                                     CONT
314 -       CONT    1       24      0.4     1.3                                     CONT
315 -       CONT    0       25      0.1     1.2
316 -       TPSSYM  2       2       4       4                                       CONT
317 -       CONT    2       21      0.08    2.                                      CONT
318 -       CONT    2       23      0.3     1.5                                     CONT
319 -       CONT    2       24      0.4     1.3                                     CONT
320 -       CONT    0       25      0.1     1.2
321 -       TPSSYM  3       3       6       4                                       CONT
322 -       CONT    3       31      0.05    1.                                      CONT
323 -       CONT    3       32      0.08    0.6                                     CONT
324 -       CONT    3       33      1.00    3.                                      CONT
325 -       CONT    3       34      0.05    0.5                                     CONT
326 -       CONT    3       35      0.05    0.5                                     CONT
327 -       CONT    0       36      0.1     0.2
328 -       TPSSYM  4       4       6       4                                       CONT
329 -       CONT    4       31      0.05    1.                                      CONT
330 -       CONT    4       32      0.08    0.6                                     CONT
331 -       CONT    4       33      1.00    3.                                      CONT
332 -       CONT    4       34      0.05    0.5                                     CONT
333 -       CONT    4       35      0.05    0.5                                     CONT
334 -       CONT    0       36      0.1     0.2
335 -       TPSSYM  5       5       6       4                                       CONT
336 -       CONT    5       31      0.05    1.                                      CONT
337 -       CONT    5       32      0.08    0.6                                     CONT
338 -       CONT    5       33      1.00    3.                                      CONT
339 -       CONT    5       34      0.05    0.5                                     CONT
340 -       CONT    5       35      0.05    0.5                                     CONT
341 -       CONT    0       36      0.1     0.2
342 -       TPSSYM  6       6       6       4                                       CONT
343 -       CONT    6       31      0.05    1.                                      CONT
344 -       CONT    6       32      0.08    0.6                                     CONT
345 -       CONT    6       33      1.00    3.                                      CONT
346 -       CONT    6       34      0.05    0.5                                     CONT
347 -       CONT    6       35      0.05    0.5                                     CONT
348 -       CONT    0       36      0.1     0.2
349 -       TPSSYM  7       7       6       4                                       CONT
350 -       CONT    7       31      0.05    1.                                      CONT
351 -       CONT    7       32      0.08    0.6                                     CONT
352 -       CONT    7       33      1.00    3.                                      CONT
353 -       CONT    7       34      0.05    0.5                                     CONT
354 -       CONT    7       35      0.05    0.5                                     CONT
355 -       CONT    0       36      0.1     0.2
356 -       TPSSYM  8       8       6       4                                       CONT
357 -       CONT    8       31      0.05    1.                                      CONT
358 -       CONT    8       32      0.08    0.6                                     CONT
359 -       CONT    8       33      1.00    3.                                      CONT
360 -       CONT    8       34      0.05    0.5                                     CONT
361 -       CONT    8       35      0.05    0.5                                     CONT
362 -       CONT    0       36      0.1     0.2
363 -       TPSSYM  9       9       4       4                                       CONT
364 -       CONT    9       21      0.08    2.                                      CONT
365 -       CONT    9       23      0.3     1.5                                     CONT
366 -       CONT    9       24      0.4     1.3                                     CONT
367 -       CONT    0       25      0.1     1.2
368 -       TPSSYM  10      10      6       4                                       CONT
369 -       CONT    10      31      0.05    1.                                      CONT
370 -       CONT    10      32      0.08    0.6                                     CONT
371 -       CONT    10      33      1.00    3.                                      CONT
372 -       CONT    10      34      0.05    0.5                                     CONT
373 -       CONT    10      35      0.05    0.5                                     CONT
374 -       CONT    0       36      0.1     0.2
375 -       TPSSYM  11      11      6       4                                       CONT
376 -       CONT    11      31      0.05    1.                                      CONT
377 -       CONT    11      32      0.08    0.6                                     CONT
378 -       CONT    11      33      1.00    3.                                      CONT
379 -       CONT    11      34      0.05    0.5                                     CONT
380 -       CONT    11      35      0.05    0.5                                     CONT
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381 -       CONT    0       36      0.1     0.2
382 -       TPSSYM  12      12      6       4                                       CONT
383 -       CONT    12      31      0.05    1.                                      CONT
384 -       CONT    12      32      0.08    0.6                                     CONT
385 -       CONT    12      33      1.00    3.                                      CONT
386 -       CONT    12      34      0.05    0.5                                     CONT
387 -       CONT    12      35      0.05    0.5                                     CONT
388 -       CONT    0       36      0.1     0.2
389 -       TPSSYM  13      13      6       4                                       CONT
390 -       CONT    13      31      0.05    1.                                      CONT
391 -       CONT    13      32      0.08    0.6                                     CONT
392 -       CONT    13      33      1.00    3.                                      CONT
393 -       CONT    13      34      0.05    0.5                                     CONT
394 -       CONT    13      35      0.05    0.5                                     CONT
395 -       CONT    0       36      0.1     0.2
396 -       TPSSYM  14      14      6       4                                       CONT
397 -       CONT    14      31      0.05    1.                                      CONT
398 -       CONT    14      32      0.08    0.6                                     CONT
399 -       CONT    14      33      1.00    3.                                      CONT
400 -       CONT    14      34      0.05    0.5                                     CONT
401 -       CONT    14      35      0.05    0.5                                     CONT
402 -       CONT    0       36      0.1     0.2
403 -       TRAJCT  1       1                                                       CONT
404 -       CONT    .00000E00.71871 .45600E64.0000  0.0                             CONT
405 -       CONT    .16000E20.98944 .41990E614.0000                                 CONT
406 -       CONT    .33000E21.34826 .43688E69.4208                                  CONT
407 -       CONT    .49000E21.63429 .58196E63.6000                                  CONT
408 -       CONT    .68000E22.17754 .82141E63.6000          TECPLOT CPTEMP1.PLT     CONT
409 -       CONT    .88000E22.99306 .11358E73.6000                                  CONT
410 -       CONT    .10800E34.03065 .14897E73.6000                                  CONT
411 -       CONT    .12800E35.30536 .18668E73.6000                                  CONT
412 -       CONT    .14700E37.18387 .22489E78.7000                                  CONT
413 -       CONT    .16500E38.14718 .26307E710.2250                                 CONT
414 -       CONT    .18500E38.48577 .29382E710.2250                                 CONT
415 -       CONT    .20500E38.73075 .31108E710.2250                                 CONT
416 -       CONT    .22500E38.80061 .31479E710.2250         TECPLOT CPTEMP2.PLT     CONT
417 -       CONT    .24500E38.62765 .30495E710.2250                                 CONT
418 -       CONT    .26300E38.35804 .28476E730.0000                                 CONT
419 -       CONT    .28300E37.92715 .25083E730.0000                                 CONT
420 -       CONT    .30300E37.42020 .20828E730.0000                                 CONT
421 -       CONT    .32300E36.98630 .17006E730.0000                                 CONT
422 -       CONT    .34100E36.51451 .15705E717.6576                                 CONT
423 -       CONT    .35900E36.29482 .15555E711.3822                                 CONT
424 -       CONT    .37900E36.12626 .15505E711.5945                                 CONT
425 -       CONT    .39900E35.96248 .15405E711.6852                                 CONT
426 -       CONT    .41900E35.80340 .15256E711.6316                                 CONT
427 -       CONT    .43900E35.64886 .15063E711.4712                                 CONT
428 -       CONT    .45900E35.49856 .14827E711.2120                                 CONT
429 -       CONT    .47900E35.35216 .14551E710.8676                                 CONT
430 -       CONT    .49900E35.20938 .14237E710.4565                                 CONT
431 -       CONT    .51900E35.06993 .13890E79.9883                                  CONT
432 -       CONT    .53900E34.92935 .13511E79.3991                                  CONT
433 -       CONT    .55900E34.78106 .13103E78.7931                                  CONT
434 -       CONT    .57900E34.62119 .12670E78.2187                                  CONT
435 -       CONT    .59900E34.44764 .12216E77.6847                                  CONT
436 -       CONT    .61900E34.25902 .11747E77.2020                                  CONT
437 -       CONT    .63900E34.05448 .11267E76.7771                                  CONT
438 -       CONT    .65900E33.82413 .10782E76.3472                                  CONT
439 -       CONT    .67900E33.56631 .10300E75.9874                                  CONT
440 -       CONT    .69900E33.28723 .98254E65.7202                                  CONT
441 -       CONT    .71759E33.00000 .93312E64.8191                                  CONT
442 -       CONT    .73600E32.68846 .87329E64.1829                                  CONT
443 -       CONT    .75600E32.29065 .80146E63.4982          TECPLOT CPTEMP3.PLT     CONT
444 -       CONT    .77600E31.86649 .72891E63.0646                                  CONT
445 -       CONT    .79600E31.47000 .66074E63.0928                                  CONT
446 -       CONT    .81600E31.14676 .59940E63.3054                                  CONT
447 -       CONT    .83600E30.96665 .54315E63.8323                                  CONT
448 -       CONT    .85600E30.86983 .48792E63.8046                                  CONT
449 -       CONT    .87400E30.80178 .43914E63.9110                                  CONT
450 -       CONT    .89400E30.73186 .38870E63.9359                                  CONT
451 -       CONT    .91400E30.67432 .34157E63.9549                                  CONT
452 -       CONT    .93400E30.62713 .29712E63.9492                                  CONT
453 -       CONT    .95400E30.58784 .25488E63.9046                                  CONT
454 -       CONT    .97400E30.55190 .21464E63.8498                                  CONT
455 -       CONT    .99400E30.51899 .17633E63.8233                                  CONT
456 -       CONT    .10140E40.48941 .13984E63.8101                                  CONT
457 -       CONT    .10340E40.46307 .10502E63.8009                                  CONT
458 -       CONT    .10540E40.43975 .71741E53.7895                                  CONT
459 -       CONT    .10740E40.41915 .39891E53.7718                                  CONT
460 -       CONT    .10940E40.40098 .93915E43.7458
461 -       TRJLST  1
462 -               1       1.
463 -       ENDDATA
```

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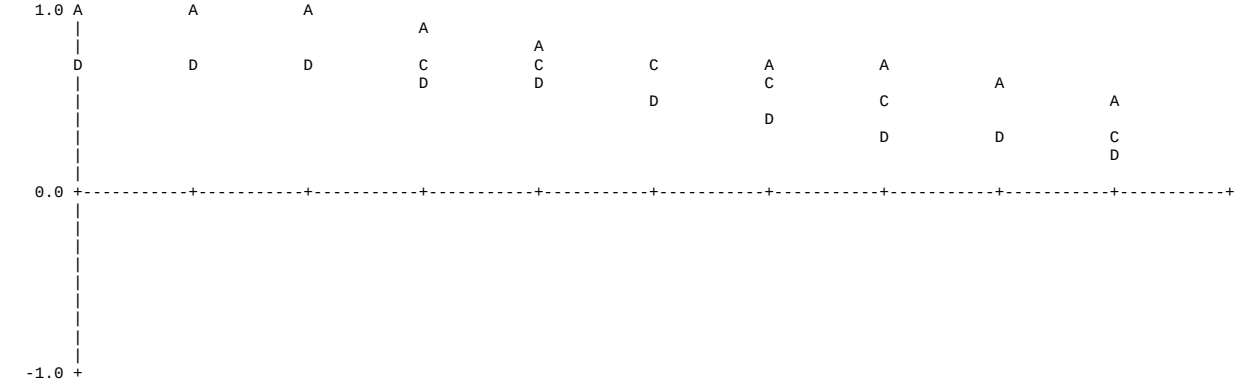
 ****************************************
 *                                      *
 *       SUBCASE       =        1       *
 *       DISCIPLINE    = TPSDES         *
 *       BULK ENTRY ID =        1       *
 *                                      *
 ****************************************
```

OPTIMIZATION SYSTEM FOR TPSSYM = 1

TOTAL NUMBER OF DESIGN VARIABLES = 27
TOTAL NUMBER OF CONSTRAINS = 1302
TOTAL NUMBER OF TEMP. CONSTRAINS = 396
TOTAL NUMBER OF TEMP. PRINTOUTS = 11

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



MAXIMUM TEMPERATURE OF EVERY LAYER

LAYER:	1	2	3	4
Tmax:	2300.33	350.33	800.33	300.33
Optv:	452.93	328.32	327.35	299.74

VALUES OF DESIGN VARIABLES :

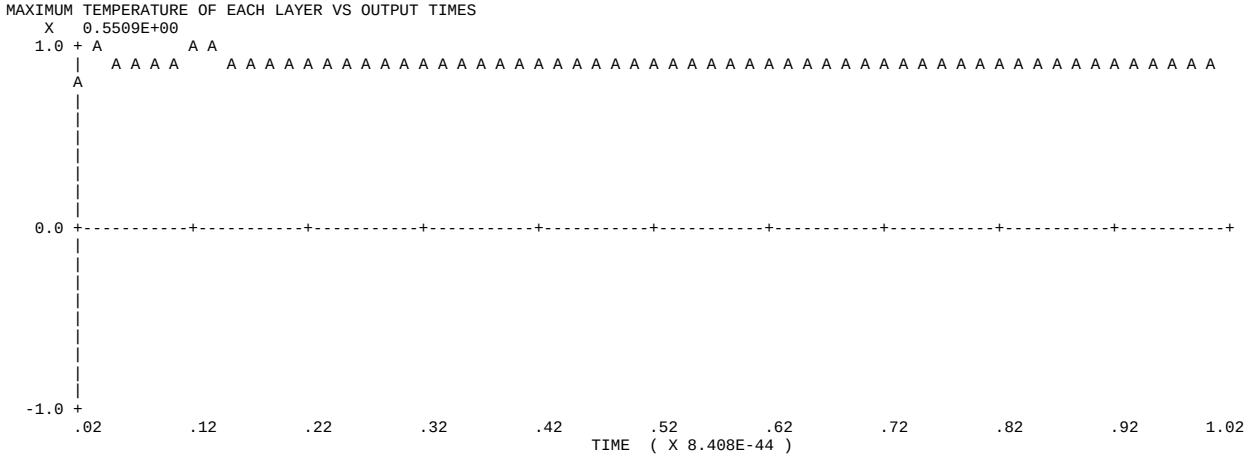
LAYER	DEV01	DEV02	DEV03	DEV04	DEV05	DEV06	DEV07	DEV08	DEV09
1	0.21576	0.13816	0.11568	0.12286	0.14818	0.18607	0.19007	0.17043	0.10599
2	0.31605	0.40681	0.32593	0.35373	0.35532	0.41773	0.66265	0.38857	0.32871
3	0.40000	0.42400	0.41852	0.49062	0.43617	0.42690	0.78345	0.73465	0.45898

THE ORIGINAL OBJECTIVE FUNCTION = 7760.2163086

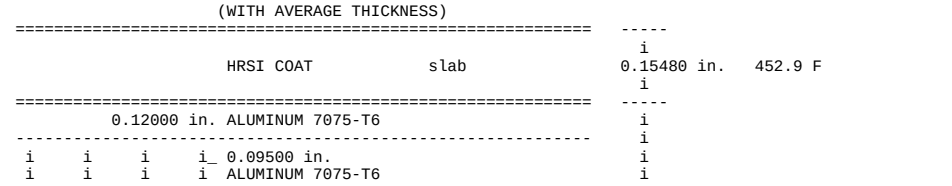
THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.5185303

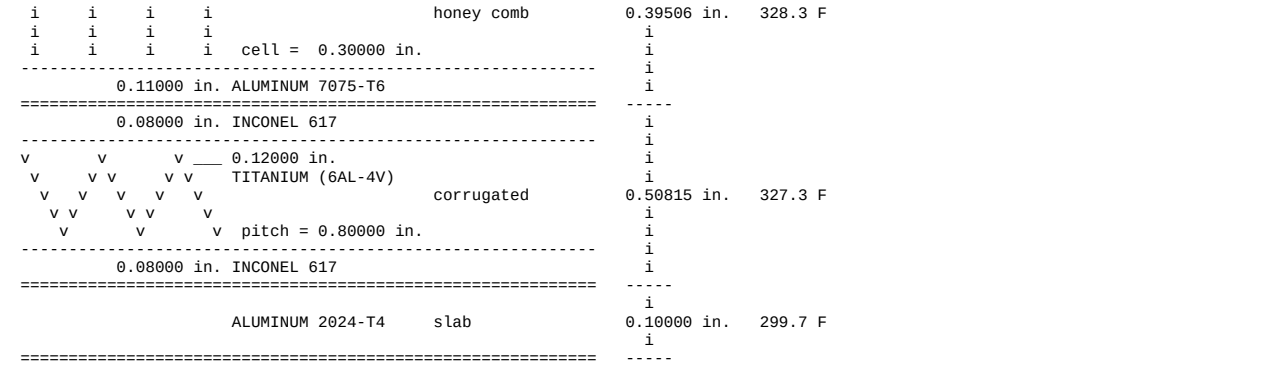
THE TOTAL OPTIMAL WEIGHT = 1.63459340E+06

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



OPTIMAL STRUCTURES OF TPS FOR PATCH = 1
(WITH AVERAGE THICKNESS)





THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH = 1

PANEL	LAYER01		LAYER02		LAYER03		LAYER04	
4	0.21576	446.48	0.31605	350.33	0.40000	327.83	0.10000	300.33
5	0.19430	392.49	0.34945	319.47	0.40760	297.95	0.10000	276.36
6	0.17378	340.94	0.37726	289.33	0.41438	268.86	0.10000	252.71
7	0.15481	293.38	0.39733	260.58	0.42001	241.24	0.10000	229.83
8	0.13816	251.78	0.40681	234.08	0.42400	215.97	0.10000	208.30
9	0.12504	219.26	0.40188	211.31	0.42570	194.49	0.10000	189.15
10	0.11682	199.27	0.37738	193.71	0.42428	178.32	0.10000	173.34
11	0.11568	197.38	0.32593	183.83	0.41852	169.96	0.10000	162.59
44	0.19221	426.12	0.30499	349.49	0.40052	326.75	0.10000	300.33
45	0.17786	214.68	0.33624	177.61	0.40292	176.97	0.10000	165.93
46	0.16322	332.12	0.36320	288.41	0.40596	268.16	0.10000	252.64
47	0.14959	288.71	0.38373	259.80	0.40900	240.76	0.10000	229.81
48	0.13852	251.12	0.39421	233.97	0.41045	216.10	0.10000	208.74
49	0.13025	221.06	0.39665	211.55	0.41513	194.74	0.10000	189.56
50	0.12763	202.78	0.38118	194.70	0.41674	178.85	0.10000	174.01
51	0.13497	201.39	0.35004	186.37	0.41802	171.02	0.10000	164.02
84	0.17076	408.09	0.29917	348.86	0.40574	325.74	0.10000	300.33
85	0.16081	364.57	0.32508	317.74	0.40280	296.19	0.10000	276.34
86	0.15199	322.93	0.34884	287.63	0.40104	267.54	0.10000	252.68
87	0.14455	284.21	0.36885	259.23	0.40068	240.45	0.10000	229.94
88	0.13961	250.82	0.38207	233.98	0.40125	216.30	0.10000	209.16
89	0.13744	223.77	0.39017	212.16	0.40506	195.30	0.10000	190.28
90	0.14097	207.18	0.38623	196.15	0.41000	179.73	0.10000	175.05
91	0.15315	205.31	0.37298	188.92	0.41808	172.20	0.10000	165.55
124	0.15257	243.60	0.29999	204.26	0.41652	203.53	0.10000	184.71
125	0.14690	353.34	0.32005	317.12	0.40965	295.36	0.10000	276.28
126	0.14321	315.70	0.33931	287.02	0.40370	266.94	0.10000	252.61
127	0.14108	205.83	0.35725	183.34	0.39988	182.76	0.10000	169.75
128	0.14129	250.75	0.37163	233.98	0.39884	216.42	0.10000	209.42
129	0.14428	226.27	0.38402	212.75	0.40089	195.83	0.10000	190.88
130	0.15273	211.07	0.39009	197.54	0.40725	180.65	0.10000	176.06
131	0.16835	208.79	0.39243	191.28	0.41890	173.45	0.10000	167.11
164	0.13850	382.78	0.30816	348.28	0.43309	324.01	0.10000	300.33
165	0.13684	345.48	0.32184	316.71	0.42369	294.56	0.10000	276.09
166	0.13733	310.70	0.33545	286.57	0.41424	266.34	0.10000	252.38
167	0.13927	278.57	0.34985	258.54	0.40720	239.89	0.10000	229.86
168	0.14335	250.78	0.36370	233.92	0.40408	216.39	0.10000	209.42
169	0.15012	228.23	0.37841	213.21	0.40354	196.23	0.10000	191.26
170	0.16179	214.08	0.39187	198.70	0.40908	181.48	0.10000	176.94
171	0.17916	211.53	0.40665	193.27	0.42053	174.69	0.10000	168.59
204	0.13022	377.24	0.32050	348.30	0.45096	323.40	0.10000	300.33
205	0.13142	341.47	0.32837	316.49	0.44043	293.91	0.10000	275.82
206	0.13451	308.12	0.33643	286.28	0.42867	265.81	0.10000	252.05
207	0.13890	277.44	0.34687	258.35	0.41916	239.59	0.10000	229.61
208	0.14525	250.83	0.35906	233.81	0.41402	216.23	0.10000	209.23
209	0.15402	229.37	0.37419	213.45	0.41073	196.43	0.10000	191.39
210	0.16701	215.81	0.39155	199.44	0.41401	182.08	0.10000	177.51
211	0.18444	213.17	0.41403	194.59	0.42248	175.68	0.10000	169.73
244	0.12674	375.32	0.33007	348.36	0.46316	323.06	0.10000	300.33
245	0.12938	340.09	0.33435	316.39	0.45248	293.51	0.10000	275.62
246	0.13365	307.19	0.33881	286.13	0.43981	265.46	0.10000	251.79
247	0.13914	277.04	0.34642	258.24	0.42894	239.36	0.10000	229.38
248	0.14647	250.86	0.35708	233.72	0.42236	216.09	0.10000	209.03
249	0.15594	229.83	0.37185	213.54	0.41705	196.50	0.10000	191.37
250	0.16915	216.52	0.39061	199.77	0.41831	182.38	0.10000	177.77
251	0.18602	213.87	0.41653	195.22	0.42385	176.25	0.10000	170.35
284	0.12501	374.59	0.33728	348.43	0.47184	322.85	0.10000	300.33
285	0.12849	339.57	0.33915	316.35	0.46131	293.25	0.10000	275.46
286	0.13342	306.82	0.34114	286.04	0.44827	265.21	0.10000	251.58
287	0.13950	276.89	0.34668	258.17	0.43653	239.20	0.10000	229.19
288	0.14731	250.89	0.35609	233.65	0.42892	215.98	0.10000	208.86
289	0.15707	230.07	0.37036	213.58	0.42207	196.52	0.10000	191.34
290	0.17019	216.86	0.38971	199.95	0.42167	182.56	0.10000	177.92
291	0.18646	214.22	0.41745	195.57	0.42483	176.61	0.10000	170.74
324	0.12372	374.28	0.34517	348.51	0.48101	322.64	0.10000	300.33
325	0.12797	339.37	0.34464	316.32	0.47083	292.99	0.10000	275.28
326	0.13346	306.66	0.34406	285.96	0.45754	264.96	0.10000	251.35
327	0.14001	276.83	0.34739	258.09	0.44497	239.01	0.10000	228.98
328	0.14818	250.92	0.35535	233.58	0.43627	215.85	0.10000	208.67
329	0.15808	230.24	0.36891	213.60	0.42778	196.53	0.10000	191.27

330	0.17097	217.11	0.38859	200.10	0.42546	182.73	0.10000	178.05
331	0.18647	214.48	0.41783	195.88	0.42584	176.95	0.10000	171.10
364	0.12286	374.37	0.35373	348.61	0.49062	322.43	0.10000	300.33
365	0.12783	339.35	0.35062	316.19	0.48072	292.62	0.10000	275.01
366	0.13380	306.52	0.34753	285.72	0.46741	264.55	0.10000	250.98
367	0.14071	276.67	0.34856	257.84	0.45402	238.65	0.10000	228.60
368	0.14921	250.73	0.35495	233.28	0.44492	215.49	0.10000	208.26
369	0.15890	230.31	0.36770	213.57	0.43338	196.49	0.10000	191.17
370	0.17148	217.26	0.38727	200.22	0.42967	182.88	0.10000	178.15
371	0.18607	214.68	0.41773	196.14	0.42690	177.29	0.10000	171.45
404	0.12242	374.72	0.36375	348.55	0.50154	322.05	0.10000	300.12
405	0.12808	339.57	0.35783	315.97	0.49219	292.15	0.10000	274.63
406	0.13447	306.52	0.35180	285.41	0.47870	264.05	0.10000	250.50
407	0.14164	276.53	0.35026	257.50	0.46452	238.19	0.10000	228.11
408	0.15026	250.58	0.35481	232.99	0.45438	215.14	0.10000	207.84
409	0.15987	230.21	0.36636	213.40	0.44101	196.31	0.10000	190.91
410	0.17184	217.26	0.38599	200.24	0.43411	182.93	0.10000	178.14
411	0.18516	214.81	0.41705	196.39	0.42818	177.66	0.10000	171.83
444	0.12268	376.12	0.38012	348.50	0.51888	321.49	0.10000	299.78
445	0.12923	340.48	0.36992	315.62	0.51073	291.38	0.10000	273.98
446	0.13604	306.82	0.35929	284.88	0.49714	263.20	0.10000	249.68
447	0.14336	276.41	0.35365	256.92	0.48185	237.39	0.10000	227.26
448	0.15191	250.26	0.35512	232.48	0.47005	214.51	0.10000	207.09
449	0.16109	229.88	0.36449	213.07	0.45378	195.95	0.10000	190.42
450	0.17193	217.04	0.38339	200.18	0.44270	182.96	0.10000	178.07
451	0.18288	214.85	0.41493	196.69	0.43021	178.21	0.10000	172.37
484	0.12503	380.07	0.40772	348.49	0.54711	320.68	0.10000	299.24
485	0.13263	343.00	0.39076	314.96	0.54143	290.05	0.10000	272.79
486	0.13963	307.84	0.37273	283.85	0.52800	261.65	0.10000	248.15
487	0.14667	276.33	0.36045	255.78	0.51116	235.90	0.10000	225.67
488	0.15452	249.55	0.35668	231.45	0.49675	213.29	0.10000	205.68
489	0.16240	228.95	0.36198	212.35	0.47578	195.22	0.10000	189.45
490	0.17080	216.22	0.37863	199.91	0.45744	182.90	0.10000	177.81
491	0.17753	214.57	0.40943	196.94	0.43355	179.00	0.10000	173.12
524	0.12972	386.22	0.43913	348.54	0.57820	319.88	0.10000	298.62
525	0.13794	346.90	0.41460	314.21	0.57545	288.57	0.10000	271.39
526	0.14458	309.54	0.38858	282.64	0.56255	259.88	0.10000	246.33
527	0.15074	276.41	0.36906	254.44	0.54427	234.16	0.10000	223.78
528	0.15721	248.62	0.35934	230.24	0.52695	211.85	0.10000	204.02
529	0.16303	227.54	0.35970	211.44	0.50091	194.31	0.10000	188.27
530	0.16816	214.86	0.37279	199.45	0.47416	182.73	0.10000	177.41
531	0.17001	213.91	0.40130	196.99	0.43720	179.75	0.10000	173.80
564	0.13580	393.49	0.47017	348.66	0.60814	319.17	0.10000	298.03
565	0.14408	351.51	0.43800	313.58	0.60807	287.25	0.10000	270.07
566	0.14998	311.73	0.40455	281.58	0.59615	258.25	0.10000	244.62
567	0.15485	276.72	0.37808	253.22	0.57660	232.54	0.10000	222.00
568	0.15956	247.71	0.36249	229.10	0.55650	210.50	0.10000	202.42
569	0.16297	225.98	0.35776	210.53	0.52554	193.42	0.10000	187.11
570	0.16459	213.24	0.36673	198.90	0.49042	182.52	0.10000	176.96
571	0.16172	213.02	0.39214	196.86	0.44065	180.39	0.10000	174.34
604	0.14354	402.37	0.50373	348.86	0.63982	318.52	0.10000	297.43
605	0.15135	357.21	0.46323	313.12	0.64248	286.05	0.10000	268.81
606	0.15618	314.69	0.42226	280.70	0.63216	256.76	0.10000	242.97
607	0.15933	277.45	0.38842	252.16	0.61153	231.03	0.10000	220.26
608	0.16184	246.89	0.36640	228.04	0.58849	209.20	0.10000	200.84
609	0.16235	224.23	0.35588	209.62	0.55227	192.54	0.10000	185.93
610	0.15998	211.31	0.35984	198.26	0.50801	182.27	0.10000	176.46
611	0.15212	211.90	0.38137	196.60	0.44425	181.00	0.10000	174.83
644	0.15304	412.90	0.54029	349.09	0.67375	317.85	0.10000	296.76
645	0.15986	363.94	0.49067	312.69	0.67929	284.82	0.10000	267.49
646	0.16303	318.14	0.44121	279.86	0.66980	255.27	0.10000	241.29
647	0.16410	278.40	0.39976	251.13	0.64821	229.52	0.10000	218.49
648	0.16404	246.06	0.37095	227.00	0.62226	207.89	0.10000	199.22
649	0.16125	222.30	0.35412	208.69	0.58061	191.63	0.10000	184.69
650	0.15451	209.10	0.35231	197.55	0.52670	181.99	0.10000	175.91
651	0.14142	210.57	0.36927	196.22	0.44795	181.57	0.10000	175.26
684	0.16419	424.95	0.57945	349.35	0.70959	317.17	0.10000	296.02
685	0.16960	371.57	0.52019	312.22	0.71851	283.53	0.10000	266.04
686	0.17039	321.87	0.46094	278.97	0.70851	253.71	0.10000	239.52
687	0.16901	279.39	0.41161	250.07	0.68556	227.97	0.10000	216.66
688	0.16611	245.15	0.37589	225.93	0.65672	206.55	0.10000	197.55
689	0.15975	220.20	0.35249	207.70	0.60957	190.68	0.10000	183.41
690	0.14842	206.69	0.34444	196.76	0.54582	181.67	0.10000	175.30
691	0.12997	209.08	0.35622	195.74	0.45168	182.11	0.10000	175.64
724	0.17659	438.31	0.62029	349.74	0.74628	316.60	0.10000	295.34
725	0.18056	380.40	0.55222	311.92	0.76023	282.32	0.10000	264.63
726	0.17865	326.38	0.48292	278.21	0.75055	252.21	0.10000	237.74
727	0.17424	280.67	0.42460	249.09	0.72507	226.46	0.10000	214.82
728	0.16811	244.29	0.38137	224.90	0.69239	205.24	0.10000	195.89
729	0.15794	218.02	0.35102	206.72	0.63893	189.74	0.10000	182.13
730	0.14201	204.18	0.33653	195.93	0.56477	181.32	0.10000	174.67
731	0.11839	207.53	0.34296	195.20	0.45528	182.59	0.10000	175.97
764	0.19007	452.93	0.66265	350.33	0.78345	316.21	0.10000	294.79
765	0.18988	388.33	0.57906	311.95	0.79411	281.60	0.10000	263.69
766	0.18683	331.41	0.50492	277.82	0.79089	251.08	0.10000	236.30
767	0.18052	282.74	0.44090	248.25	0.77194	224.95	0.10000	212.91
768	0.17043	243.60	0.38857	223.93	0.73465	203.90	0.10000	194.12
769	0.15575	215.64	0.34974	205.71	0.67245	188.76	0.10000	180.75
770	0.13493	201.42	0.32802	195.04	0.58550	180.94	0.10000	173.98
771	0.10599	205.83	0.32871	194.58	0.45898	183.05	0.10000	176.26

OPTIMIZATION SYSTEM FOR TPSSYM = 2

```
 TOTAL NUMBER OF DESIGN VARIABLES =   27
 TOTAL NUMBER OF CONSTRAINS       = 1062
 TOTAL NUMBER OF TEMP. CONSTRAINS =  396
 TOTAL NUMBER OF TEMP. PRINTOUTS  =   11


MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
    X   0.6838E+03
   1.0 A
       |           A
       |                       A
       |                                   A
       |                                               A
       C           C           C           C                       A           A
       D           D           D           D           D           C           C           A           A           A
       |                                                           D           D           C
       |                                                                                   D           D           D
       |
   0.0 +-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+
       |
       |
       |
       |
       |
       |
       |
       |
       |
  -1.0 +
       .10         .20         .30         .40         .50         .60         .70         .80         .90         1.00      1.10
                                                             TIME  ( X 1.401E-44 )


               MAXIMUM TEMPERATURE OF EVERY LAYER
LAYER:        1        2        3        4
Tmax:   2300.33   350.33   800.33   300.33
Optv:    683.79   323.75   322.17   297.61

                    VALUES OF DESIGN VARIABLES :
LAYER    DEV01    DEV02    DEV03    DEV04    DEV05    DEV06    DEV07    DEV08    DEV09
    1  0.25962  0.14541  0.15421  0.46935  0.38882  0.35891  0.29578  0.37768  0.22798
    2  0.85539  0.36679  0.31244  0.63331  0.39891  0.30137  0.60128  0.55816  0.30178
    3  0.60571  0.43798  0.40000  0.47894  0.44026  0.40182  0.48369  0.44099  0.40237

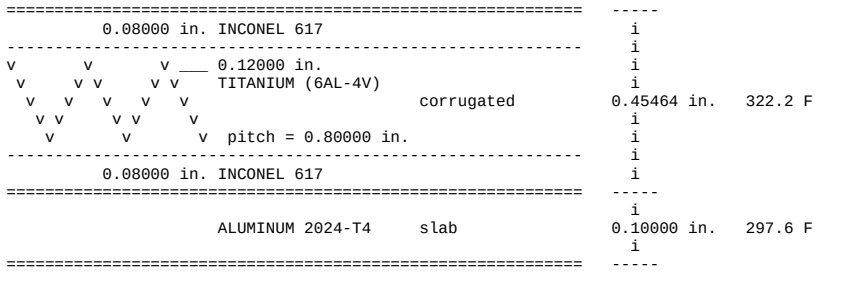
 THE ORIGINAL OBJECTIVE FUNCTION =    5818.9228516

 THE RATIO OF OPTIMAL OBJECTIVE FUNCTION =   0.5389165

 THE TOTAL OPTIMAL WEIGHT = 9.55097023E+05


MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
    X   0.1720E+01
   1.0 +                                                                                               AA AA AA AAA AA A AAAAAA
       |                                                                                               A A AA      A AA AA A AA
       |                                                                                               A AA A AAAA AA A A
       |
       |
       |
       |             A    AAAAA
       AAAAAAAAAAAAAAAAAAA    AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA      A    A     A
       |                                                                                                AA A  AAA  A A A  A AA
       |
   0.0 +-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+
       |
       |
       |
       |
       |
       |
       |
       |
       |
  -1.0 +
       .00         .10         .20         .30         .40         .50         .60         .70         .80         .90       1.00
                                                             TIME  ( X 4.064E-43 )

               OPTIMAL STRUCTURES OF TPS FOR PATCH =       2
                      (WITH AVERAGE THICKNESS)
 ============================================================   -----
                                                                  i
                       HRSI COAT           slab                 0.29753 in.   683.8 F
                                                                  i
 ============================================================   -----
           0.12000 in. ALUMINUM 7075-T6                           i
 ------------------------------------------------------------     i
  i     i     i     i_ 0.09500 in.                                i
  i     i     i     i  ALUMINUM 7075-T6                           i
  i     i     i     i                      honey comb           0.48105 in.   323.8 F
  i     i     i     i                                             i
  i     i     i     i   cell =  0.30000 in.                       i
 ------------------------------------------------------------     i
           0.11000 in. ALUMINUM 7075-T6                           i
```



THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH = 2

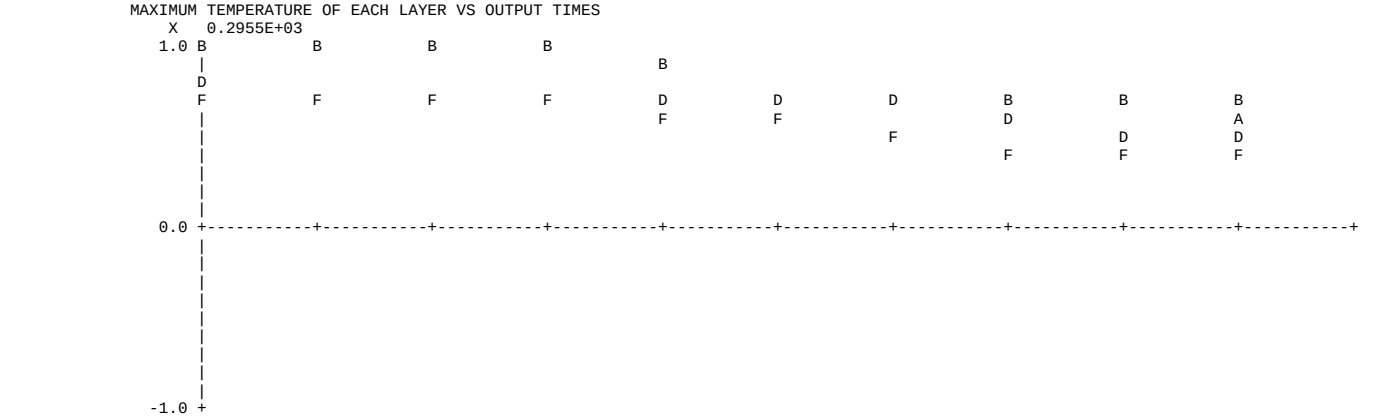
PANEL	LAYER01		LAYER02		LAYER03		LAYER04	
884	0.25962	552.90	0.85539	350.33	0.60571	305.13	0.10000	290.60
885	0.22139	468.08	0.70083	325.29	0.55454	288.28	0.10000	276.00
886	0.18928	394.10	0.56697	302.18	0.50932	272.19	0.10000	261.91
887	0.16366	331.40	0.45474	280.97	0.47024	256.76	0.10000	248.23
888	0.14541	281.34	0.36679	261.78	0.43798	241.95	0.10000	234.91
889	0.13609	246.74	0.30852	245.14	0.41410	227.99	0.10000	222.09
890	0.13783	230.88	0.28638	231.38	0.40030	214.82	0.10000	209.67
891	0.15421	240.08	0.31244	221.57	0.40000	202.84	0.10000	197.89
924	0.31050	583.19	0.81191	350.22	0.57988	300.59	0.10000	287.59
925	0.24333	479.35	0.68561	325.85	0.54646	285.79	0.10000	274.05
926	0.20614	401.56	0.55796	303.11	0.50533	269.99	0.10000	260.04
927	0.19100	342.36	0.44579	283.48	0.46746	253.14	0.10000	244.99
928	0.19176	298.56	0.35999	267.58	0.43815	236.17	0.10000	229.54
929	0.16337	256.16	0.30692	249.16	0.41571	224.99	0.10000	219.26
930	0.15847	238.08	0.28619	234.78	0.40168	213.21	0.10000	208.16
931	0.19940	257.05	0.31043	229.36	0.40029	201.48	0.10000	196.82
964	0.35523	610.13	0.77179	350.16	0.55627	296.84	0.10000	285.08
965	0.28999	504.02	0.65511	327.35	0.52974	280.76	0.10000	270.11
966	0.25442	424.03	0.53608	306.25	0.49495	264.07	0.10000	254.99
967	0.24086	362.90	0.43288	288.30	0.46293	246.68	0.10000	239.18
968	0.23887	316.16	0.35619	273.46	0.43845	230.19	0.10000	224.00
969	0.21143	273.02	0.30645	256.30	0.41873	219.71	0.10000	214.29
970	0.20350	253.84	0.28676	242.23	0.40473	209.68	0.10000	204.86
971	0.24123	272.80	0.30850	236.61	0.40058	200.27	0.10000	195.87
1004	0.39301	633.24	0.73552	350.15	0.53520	293.95	0.10000	283.13
1005	0.33190	526.30	0.62792	328.81	0.51441	276.35	0.10000	266.60
1006	0.29846	444.55	0.51800	309.23	0.48550	258.70	0.10000	250.35
1007	0.28535	381.25	0.42460	292.65	0.45903	240.85	0.10000	233.89
1008	0.28008	331.59	0.35635	278.56	0.43878	224.81	0.10000	219.00
1009	0.25373	287.92	0.30889	262.50	0.42141	214.89	0.10000	209.77
1010	0.24406	268.09	0.28883	248.88	0.40753	206.39	0.10000	201.81
1011	0.27611	285.97	0.30681	242.70	0.40084	199.31	0.10000	195.14
1044	0.42333	652.18	0.70341	350.17	0.51688	291.95	0.10000	281.75
1045	0.36782	545.53	0.60470	330.16	0.50082	272.71	0.10000	263.62
1046	0.33609	462.12	0.50461	311.87	0.47739	254.11	0.10000	246.32
1047	0.32189	396.35	0.42120	296.27	0.45592	235.98	0.10000	229.44
1048	0.31333	344.10	0.36003	282.62	0.43910	220.32	0.10000	214.83
1049	0.28865	300.30	0.31390	267.53	0.42366	210.74	0.10000	205.89
1050	0.27873	280.33	0.29236	254.51	0.40997	203.45	0.10000	199.10
1051	0.30482	296.86	0.30532	247.77	0.40108	198.58	0.10000	194.60
1084	0.44602	666.87	0.67569	350.21	0.50140	290.86	0.10000	280.96
1085	0.39711	561.39	0.58583	331.38	0.48918	269.89	0.10000	261.23
1086	0.36632	476.32	0.49609	314.10	0.47082	250.45	0.10000	243.03
1087	0.35019	408.16	0.42196	299.11	0.45359	232.14	0.10000	225.90
1088	0.33927	354.00	0.36646	285.75	0.43941	216.68	0.10000	211.45
1089	0.31674	310.41	0.32105	271.49	0.42553	207.23	0.10000	202.64
1090	0.30722	290.46	0.29723	259.09	0.41207	200.90	0.10000	196.76
1091	0.32736	305.46	0.30404	251.81	0.40129	198.08	0.10000	194.25
1124	0.46122	677.33	0.65235	350.27	0.48878	290.64	0.10000	280.73
1125	0.41942	573.68	0.57143	332.44	0.47960	267.95	0.10000	259.47
1126	0.38944	487.31	0.49191	315.92	0.46569	247.70	0.10000	240.48
1127	0.37161	417.27	0.42582	301.32	0.45189	229.21	0.10000	223.16
1128	0.35950	361.92	0.37502	288.16	0.43971	213.74	0.10000	208.72
1129	0.33915	318.64	0.33004	274.58	0.42707	204.27	0.10000	199.90
1130	0.32983	298.60	0.30337	262.68	0.41385	198.71	0.10000	194.77
1131	0.34371	311.76	0.30296	254.82	0.40149	197.81	0.10000	194.10
1164	0.46935	683.79	0.63331	350.33	0.47894	291.21	0.10000	281.01
1165	0.43473	582.40	0.56145	333.32	0.47213	266.85	0.10000	258.33
1166	0.40679	495.71	0.49129	317.42	0.46171	245.68	0.10000	238.53
1167	0.38848	424.60	0.43229	303.10	0.45059	226.85	0.10000	220.92
1168	0.37579	368.47	0.38573	290.07	0.44000	211.24	0.10000	206.40
1169	0.35723	325.46	0.34097	276.97	0.42837	201.67	0.10000	197.53
1170	0.34737	305.01	0.31087	265.38	0.41535	196.81	0.10000	193.07
1171	0.35421	315.91	0.30207	256.86	0.40166	197.75	0.10000	194.12
1204	0.47086	683.79	0.61686	350.32	0.47115	292.48	0.10000	281.71
1205	0.44215	586.90	0.55653	333.90	0.46775	266.55	0.10000	257.86
1206	0.41907	501.78	0.49369	318.61	0.45871	244.31	0.10000	237.10
1207	0.40181	430.51	0.44149	304.55	0.44960	224.90	0.10000	219.03
1208	0.38882	373.88	0.39893	291.53	0.44027	209.06	0.10000	204.37
1209	0.37151	331.01	0.35415	278.72	0.42943	199.35	0.10000	195.42
1210	0.36009	309.79	0.31990	267.23	0.41659	195.15	0.10000	191.60
1211	0.35891	317.90	0.30137	257.94	0.40182	197.92	0.10000	194.33
1244	0.46548	683.79	0.60388	350.32	0.46573	294.58	0.10000	282.93
1245	0.44703	589.66	0.55220	334.46	0.46280	266.60	0.10000	257.46
1246	0.42713	505.32	0.49881	319.48	0.45638	243.25	0.10000	235.88

1247	0.41166	434.45	0.45369	305.55	0.44882	223.14	0.10000	217.28
1248	0.39861	377.69	0.41499	292.42	0.44043	207.02	0.10000	202.46
1249	0.38185	335.06	0.36963	279.72	0.43018	197.24	0.10000	193.54
1250	0.36783	312.84	0.33041	268.14	0.41747	194.33	0.10000	190.81
1251	0.35761	317.69	0.30084	258.03	0.40196	198.31	0.10000	194.74
1284	0.45096	678.17	0.59363	350.31	0.46262	297.94	0.10000	284.94
1285	0.44409	588.30	0.55255	334.88	0.45965	267.65	0.10000	257.70
1286	0.43066	506.51	0.50983	320.18	0.45470	242.68	0.10000	234.91
1287	0.41783	436.72	0.47207	306.20	0.44839	221.65	0.10000	215.70
1288	0.40487	380.20	0.43618	292.77	0.44059	205.17	0.10000	200.74
1289	0.38826	337.78	0.38971	279.94	0.43067	195.24	0.10000	191.78
1290	0.37019	314.10	0.34395	268.01	0.41806	194.33	0.10000	190.81
1291	0.34876	314.71	0.30050	256.91	0.40209	199.04	0.10000	195.43
1324	0.42090	663.23	0.58749	350.31	0.46316	303.49	0.10000	288.32
1325	0.42848	580.31	0.56042	335.10	0.45923	270.37	0.10000	259.02
1326	0.42483	503.13	0.53029	320.44	0.45460	243.18	0.10000	234.66
1327	0.41723	436.07	0.50031	306.20	0.44858	220.74	0.10000	214.55
1328	0.40569	380.73	0.46655	292.25	0.44075	203.58	0.10000	199.25
1329	0.38847	338.50	0.41803	278.95	0.43080	194.33	0.10000	190.81
1330	0.36388	312.49	0.36294	266.23	0.41823	194.33	0.10000	190.81
1331	0.32723	307.11	0.30042	253.76	0.40222	200.32	0.10000	196.62
1364	0.38168	642.90	0.58810	350.32	0.46787	309.94	0.10000	292.28
1365	0.40275	566.97	0.57466	335.03	0.46211	274.22	0.10000	261.19
1366	0.40984	495.44	0.55554	320.13	0.45638	244.79	0.10000	235.32
1367	0.40892	432.21	0.53151	305.45	0.44945	220.79	0.10000	214.24
1368	0.39990	378.80	0.49846	290.89	0.44086	202.77	0.10000	198.49
1369	0.38140	336.70	0.44741	276.82	0.43047	194.33	0.10000	190.81
1370	0.34935	308.04	0.38259	263.05	0.41787	194.33	0.10000	190.81
1371	0.29729	296.37	0.30068	249.18	0.40230	201.88	0.10000	198.03
1404	0.34225	622.05	0.59282	350.32	0.47451	316.04	0.10000	296.04
1405	0.37420	552.07	0.59094	334.76	0.46667	278.26	0.10000	263.58
1406	0.39117	486.09	0.58031	319.50	0.45907	246.86	0.10000	236.46
1407	0.39694	426.88	0.56025	304.34	0.45063	221.42	0.10000	214.50
1408	0.39079	375.61	0.52697	289.19	0.44093	202.57	0.10000	198.29
1409	0.37076	333.58	0.47351	274.30	0.42990	194.33	0.10000	190.81
1410	0.33171	302.43	0.40009	259.45	0.41723	194.33	0.10000	190.81
1411	0.26600	285.06	0.30112	244.30	0.40235	203.41	0.10000	199.39
1444	0.29578	597.19	0.60128	350.33	0.48369	322.96	0.10000	300.33
1445	0.33853	533.40	0.61156	334.33	0.47324	283.14	0.10000	266.57
1446	0.36656	473.88	0.60912	318.52	0.46291	249.64	0.10000	238.15
1447	0.38020	419.54	0.59237	302.77	0.45223	222.60	0.10000	215.22
1448	0.37768	370.96	0.55816	286.95	0.44099	202.78	0.10000	198.47
1449	0.35568	328.98	0.50200	271.04	0.42907	194.33	0.10000	190.81
1450	0.30869	294.99	0.41929	254.90	0.41629	194.33	0.10000	190.81
1451	0.22798	271.26	0.30178	238.31	0.40237	205.19	0.10000	200.96

OPTIMIZATION SYSTEM FOR TPSSYM = 3

TOTAL NUMBER OF DESIGN VARIABLES = 45
TOTAL NUMBER OF CONSTRAINS = 2064
TOTAL NUMBER OF TEMP. CONSTRAINS = 594
TOTAL NUMBER OF TEMP. PRINTOUTS = 11

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



MAXIMUM TEMPERATURE OF EVERY LAYER

LAYER:	1	2	3	4	5	6
Tmax:	2300.33	2020.33	1800.33	2020.33	550.33	300.33
Optv:	295.54	295.54	232.49	232.49	203.76	203.76

VALUES OF DESIGN VARIABLES :

LAYER	DEV01	DEV02	DEV03	DEV04	DEV05	DEV06	DEV07	DEV08	DEV09
1	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000
2	0.08000	0.08000	0.08000	0.08000	0.08000	0.08000	0.08000	0.08000	0.08000
3	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
4	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000

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   5  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000

 THE ORIGINAL OBJECTIVE FUNCTION =     545.4285278

 THE RATIO OF OPTIMAL OBJECTIVE FUNCTION =   0.5028006

 THE TOTAL OPTIMAL WEIGHT = 6.25791764E+05


MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
    X   0.5028E+00
  1.0 A
      |
      |
      |
      |
      |
      |
      |
      |
      |
  0.0 +-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+
      |
      |
      |
      |
      |
      |
      |
      |
      |
 -1.0 +
      1.00        1.10        1.20        1.30        1.40        1.50        1.60        1.70        1.80        1.90      2.00
                                                              TIME  ( X 0.000E+00 )

              OPTIMAL STRUCTURES OF TPS FOR PATCH =       3
                     (WITH AVERAGE THICKNESS)
 ============================================================   -----
                      HRSI COAT            thin skin           0.05000 in.   295.5 F
 ============================================================   -----
                                                                  i
                      AB312 Fabric         slab                0.08000 in.   295.5 F
                                                                  i
 ============================================================   -----
                      Q-Felt(3.5 PCF)      thin skin           1.00001 in.   232.5 F
 ============================================================   -----
                                                                  i
                      AB312 Fabric         slab                0.05000 in.   232.5 F
                                                                  i
 ============================================================   -----
                      RTV-560              thin skin           0.05000 in.   203.8 F
 ============================================================   -----
                                                                  i
                      ALUMINUM 2024-T4     slab                0.15000 in.   203.8 F
                                                                  i
 ============================================================   -----


         THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =       3

   PANEL   LAYER01            LAYER02            LAYER03            LAYER04            LAYER05            LAYER06
      17   0.05000    237.06  0.08000    237.06  1.00000    206.18  0.05000    175.30  0.05000    163.42  0.15000    151.54
      18   0.05000    236.18  0.08000    236.18  1.00000    205.83  0.05000    175.48  0.05000    163.86  0.15000    152.24
      19   0.05000    235.48  0.08000    235.48  1.00000    205.56  0.05000    175.65  0.05000    164.24  0.15000    152.82
      20   0.05000    234.73  0.08000    234.73  1.00000    205.29  0.05000    175.86  0.05000    164.67  0.15000    153.49
      21   0.05000    233.91  0.08000    233.91  1.00000    205.04  0.05000    176.18  0.05000    165.25  0.15000    154.32
      22   0.05000    233.20  0.08000    233.20  1.00000    204.90  0.05000    176.60  0.05000    165.92  0.15000    155.24
      23   0.05000    232.76  0.08000    232.76  1.00000    204.94  0.05000    177.12  0.05000    166.66  0.15000    156.20
      24   0.05000    232.55  0.08000    232.55  1.00000    205.09  0.05000    177.63  0.05000    167.33  0.15000    157.03
      25   0.05000    232.55  0.08000    232.51  1.00000    205.33  0.05000    178.15  0.05000    167.98  0.15000    157.81
      26   0.05000    232.67  0.08000    232.67  1.00000    205.79  0.05000    178.92  0.05000    168.88  0.15000    158.85
      27   0.05000    233.12  0.08000    233.12  1.00000    206.48  0.05000    179.85  0.05000    169.92  0.15000    159.99
      28   0.05000    233.67  0.08000    233.67  1.00000    207.16  0.05000    180.64  0.05000    170.76  0.15000    160.89
      29   0.05000    234.28  0.08000    234.28  1.00000    207.82  0.05000    181.36  0.05000    171.50  0.15000    161.64
      57   0.05000    237.61  0.08000    237.61  1.00000    208.67  0.05000    179.73  0.05000    168.93  0.15000    158.12
      58   0.05000    238.66  0.08000    238.66  1.00001    209.09  0.05000    179.52  0.05000    169.01  0.15000    158.49
      59   0.05000    239.32  0.08000    239.32  1.00002    209.29  0.05000    179.26  0.05000    168.95  0.15000    158.64
      60   0.05000    239.78  0.08000    239.78  1.00002    209.42  0.05000    179.06  0.05000    168.95  0.15000    158.84
      61   0.05000    239.93  0.08000    239.93  1.00003    209.46  0.05000    178.99  0.05000    169.06  0.15000    159.14
      62   0.05000    239.62  0.08000    239.62  1.00003    209.37  0.05000    179.11  0.05000    169.32  0.15000    159.52
      63   0.05000    238.85  0.08000    238.85  1.00002    209.11  0.05000    179.37  0.05000    169.63  0.15000    159.90
      64   0.05000    238.33  0.08000    238.33  1.00002    209.06  0.05000    179.79  0.05000    170.11  0.15000    160.43
      65   0.05000    238.37  0.08000    238.37  1.00002    209.42  0.05000    180.47  0.05000    170.86  0.15000    161.26
      66   0.05000    239.24  0.08000    239.24  1.00002    210.55  0.05000    181.85  0.05000    172.37  0.15000    162.88
      67   0.05000    240.22  0.08000    240.22  1.00001    211.92  0.05000    183.61  0.05000    174.18  0.15000    164.76
      68   0.05000    241.02  0.08000    241.02  1.00001    213.10  0.05000    185.19  0.05000    175.76  0.15000    166.32
      69   0.05000    241.61  0.08000    241.61  1.00000    214.09  0.05000    186.58  0.05000    177.10  0.15000    167.62
      97   0.05000    243.76  0.08000    243.76  1.00000    216.05  0.05000    188.34  0.05000    178.00  0.15000    167.67
      98   0.05000    245.31  0.08000    245.31  1.00002    216.18  0.05000    187.05  0.05000    177.05  0.15000    167.05
      99   0.05000    246.11  0.08000    246.11  1.00003    215.90  0.05000    185.68  0.05000    175.95  0.15000    166.22
     100   0.05000    246.76  0.08000    246.76  1.00004    215.58  0.05000    184.39  0.05000    174.92  0.15000    165.45
     101   0.05000    247.01  0.08000    247.01  1.00005    215.11  0.05000    183.22  0.05000    173.97  0.15000    164.73
     102   0.05000    246.46  0.08000    246.46  1.00005    214.43  0.05000    182.40  0.05000    173.28  0.15000    164.15
     103   0.05000    245.04  0.08000    245.04  1.00005    213.51  0.05000    181.97  0.05000    172.84  0.15000    163.71
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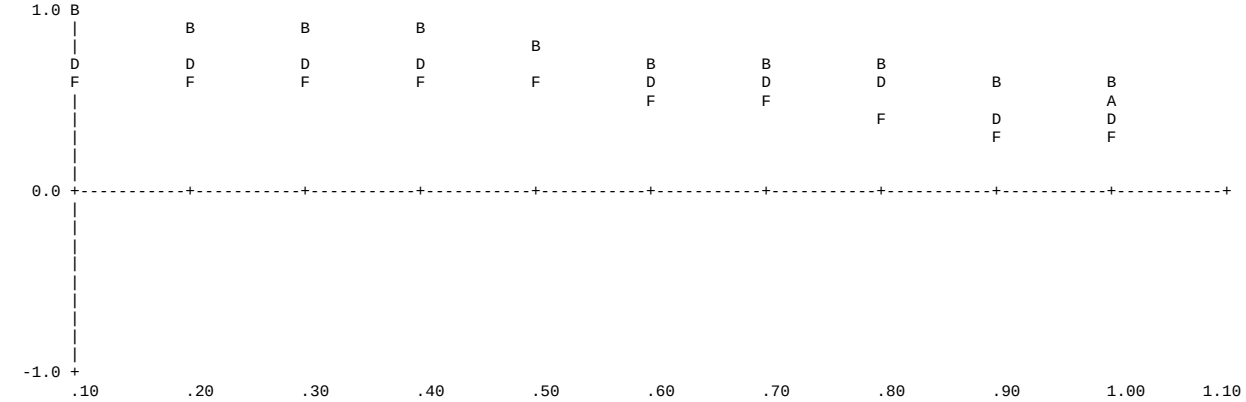
104	0.05000	243.95	0.08000	243.95	1.00004	213.01	0.05000	182.08	0.05000	172.92	0.15000	163.75
105	0.05000	244.01	0.08000	244.01	1.00004	213.41	0.05000	182.81	0.05000	173.68	0.15000	164.56
106	0.05000	245.15	0.08000	245.15	1.00003	214.83	0.05000	184.52	0.05000	175.48	0.15000	166.43
107	0.05000	246.22	0.08000	246.22	1.00002	216.49	0.05000	186.75	0.05000	177.71	0.15000	168.68
108	0.05000	246.93	0.08000	246.93	1.00001	217.86	0.05000	188.79	0.05000	179.68	0.15000	170.58
109	0.05000	247.31	0.08000	247.31	1.00000	218.93	0.05000	190.56	0.05000	181.35	0.15000	172.14
137	0.05000	257.72	0.08000	257.72	1.00000	229.84	0.05000	201.95	0.05000	191.02	0.15000	180.08
138	0.05000	257.02	0.08000	257.02	1.00002	227.70	0.05000	198.39	0.05000	187.93	0.15000	177.46
139	0.05000	255.81	0.08000	255.81	1.00003	225.31	0.05000	194.82	0.05000	184.81	0.15000	174.81
140	0.05000	255.04	0.08000	255.04	1.00005	223.32	0.05000	191.60	0.05000	182.05	0.15000	172.49
141	0.05000	254.32	0.08000	254.32	1.00006	221.49	0.05000	188.66	0.05000	179.54	0.15000	170.42
142	0.05000	253.07	0.08001	253.07	1.00007	219.72	0.05000	186.37	0.05000	177.54	0.15000	168.72
143	0.05000	250.92	0.08001	250.92	1.00006	217.89	0.05000	184.85	0.05000	176.11	0.15000	167.36
144	0.05000	249.27	0.08000	249.27	1.00005	216.86	0.05000	184.45	0.05000	175.68	0.15000	166.90
145	0.05000	249.19	0.08000	249.19	1.00005	217.14	0.05000	185.09	0.05000	176.33	0.15000	167.57
146	0.05000	250.41	0.08000	250.41	1.00004	218.68	0.05000	186.95	0.05000	178.24	0.15000	169.53
147	0.05000	251.42	0.08000	251.42	1.00003	220.44	0.05000	189.46	0.05000	180.71	0.15000	171.96
148	0.05000	251.94	0.08000	251.94	1.00002	221.85	0.05000	191.77	0.05000	182.91	0.15000	174.05
149	0.05000	252.09	0.08000	252.09	1.00000	222.94	0.05000	193.79	0.05000	184.79	0.15000	175.79
177	0.05000	275.12	0.08000	275.12	1.00000	245.85	0.05000	216.58	0.05000	204.22	0.15000	191.87
178	0.05000	271.68	0.08000	271.68	1.00001	241.63	0.05000	211.58	0.05000	199.76	0.15000	187.95
179	0.05000	267.74	0.08000	267.74	1.00003	236.89	0.05000	206.05	0.05000	194.91	0.15000	183.78
180	0.05000	264.39	0.08000	264.39	1.00004	232.45	0.05000	200.50	0.05000	190.12	0.15000	179.73
181	0.05000	261.40	0.08000	261.40	1.00006	228.19	0.05000	194.97	0.05000	185.39	0.15000	175.81
182	0.05000	258.78	0.08001	258.78	1.00007	224.70	0.05000	190.62	0.05000	181.68	0.15000	172.74
183	0.05000	256.19	0.08001	256.19	1.00007	222.06	0.05000	187.93	0.05000	179.32	0.15000	170.70
184	0.05000	254.29	0.08001	254.29	1.00007	220.63	0.05000	186.97	0.05000	178.43	0.15000	169.89
185	0.05000	253.90	0.08000	253.90	1.00006	220.62	0.05000	187.33	0.05000	178.81	0.15000	170.29
186	0.05000	254.97	0.08000	254.97	1.00005	222.06	0.05000	189.14	0.05000	180.64	0.15000	172.14
187	0.05000	255.96	0.08000	255.96	1.00004	223.88	0.05000	191.80	0.05000	183.24	0.15000	174.67
188	0.05000	256.30	0.08000	256.30	1.00002	225.29	0.05000	194.28	0.05000	185.58	0.15000	176.88
189	0.05000	256.20	0.08000	256.20	1.00000	226.31	0.05000	196.42	0.05000	187.56	0.15000	178.70
217	0.05000	286.43	0.08000	286.43	1.00000	255.97	0.05000	225.51	0.05000	212.07	0.15000	198.63
218	0.05000	282.13	0.08000	282.13	1.00001	251.40	0.05000	220.66	0.05000	207.63	0.15000	194.60
219	0.05000	276.83	0.08000	276.83	1.00002	245.72	0.05000	214.61	0.05000	202.28	0.15000	189.96
220	0.05000	271.63	0.08000	271.63	1.00003	239.73	0.05000	207.83	0.05000	196.40	0.15000	184.98
221	0.05000	266.97	0.08000	266.97	1.00005	233.83	0.05000	200.69	0.05000	190.34	0.15000	179.99
222	0.05000	263.31	0.08001	263.31	1.00007	229.01	0.05000	194.71	0.05000	185.35	0.15000	175.99
223	0.05000	260.27	0.08001	260.27	1.00008	225.54	0.05000	190.81	0.05000	182.08	0.15000	173.34
224	0.05000	258.43	0.08001	258.43	1.00007	223.90	0.05000	189.38	0.05000	180.87	0.15000	172.37
225	0.05000	257.63	0.08001	257.63	1.00007	223.47	0.05000	189.31	0.05000	180.87	0.15000	172.43
226	0.05000	258.10	0.08000	258.10	1.00006	224.42	0.05000	190.74	0.05000	182.31	0.15000	173.89
227	0.05000	258.71	0.08000	258.71	1.00004	225.96	0.05000	193.21	0.05000	184.70	0.15000	176.19
228	0.05000	258.74	0.08000	258.74	1.00002	227.15	0.05000	195.56	0.05000	186.91	0.15000	178.25
229	0.05000	258.27	0.08000	258.27	1.00000	227.94	0.05000	197.62	0.05000	188.79	0.15000	179.97
257	0.05000	290.63	0.08000	290.63	1.00000	259.69	0.05000	228.75	0.05000	214.89	0.15000	201.02
258	0.05000	286.49	0.08000	286.49	1.00000	255.43	0.05000	224.38	0.05000	210.81	0.15000	197.24
259	0.05000	281.18	0.08000	281.18	1.00001	249.94	0.05000	218.71	0.05000	205.74	0.15000	192.77
260	0.05000	275.55	0.08000	275.55	1.00003	243.73	0.05000	211.91	0.05000	199.81	0.15000	187.70
261	0.05000	270.33	0.08000	270.33	1.00005	237.40	0.05000	204.46	0.05000	193.47	0.15000	182.48
262	0.05000	266.36	0.08001	266.36	1.00007	232.17	0.05000	197.98	0.05000	188.10	0.15000	178.23
263	0.05000	263.36	0.08001	263.36	1.00008	228.41	0.05000	193.46	0.05000	184.43	0.15000	175.40
264	0.05000	261.46	0.08001	261.46	1.00008	226.47	0.05000	191.47	0.05000	182.84	0.15000	174.20
265	0.05000	260.47	0.08001	260.47	1.00007	225.75	0.05000	191.02	0.05000	182.54	0.15000	174.05
266	0.05000	260.29	0.08000	260.29	1.00006	226.12	0.05000	191.95	0.05000	183.50	0.15000	175.06
267	0.05000	261.47	0.08000	261.47	1.00004	228.07	0.05000	194.68	0.05000	186.11	0.15000	177.55
268	0.05000	260.80	0.08000	260.80	1.00002	228.68	0.05000	196.56	0.05000	187.86	0.15000	179.17
269	0.05000	259.91	0.08000	259.91	1.00000	229.12	0.05000	198.33	0.05000	189.49	0.15000	180.64
297	0.05000	292.42	0.08000	292.42	1.00000	261.27	0.05000	230.12	0.05000	216.08	0.15000	202.03
298	0.05000	288.57	0.08000	288.57	1.00000	257.36	0.05000	226.16	0.05000	212.32	0.15000	198.48
299	0.05000	283.60	0.08000	283.60	1.00001	252.29	0.05000	220.99	0.05000	207.64	0.15000	194.30
300	0.05000	278.16	0.08000	278.16	1.00002	246.42	0.05000	214.68	0.05000	202.08	0.15000	189.49
301	0.05000	272.97	0.08000	272.97	1.00004	240.29	0.05000	207.61	0.05000	196.01	0.15000	184.42
302	0.05000	269.02	0.08000	269.02	1.00006	235.14	0.05000	201.26	0.05000	190.74	0.15000	180.22
303	0.05000	266.26	0.08001	266.26	1.00007	231.41	0.05000	196.56	0.05000	186.98	0.15000	177.40
304	0.05000	264.60	0.08001	264.60	1.00007	229.40	0.05000	194.19	0.05000	185.16	0.15000	176.14
305	0.05000	263.88	0.08001	263.88	1.00007	228.71	0.05000	193.55	0.05000	184.76	0.15000	175.98
306	0.05000	263.73	0.08000	263.73	1.00006	228.99	0.05000	194.24	0.05000	185.51	0.15000	176.77
307	0.05000	262.98	0.08000	262.98	1.00004	229.25	0.05000	195.51	0.05000	186.71	0.15000	177.91
308	0.05000	261.71	0.08000	261.71	1.00002	229.21	0.05000	196.71	0.05000	187.81	0.15000	178.92
309	0.05000	260.28	0.08000	260.28	1.00000	229.07	0.05000	197.87	0.05000	188.87	0.15000	179.86
337	0.05000	293.65	0.08000	293.65	1.00000	262.35	0.05000	231.06	0.05000	216.88	0.15000	202.71
338	0.05000	290.16	0.08000	290.16	1.00000	258.83	0.05000	227.50	0.05000	213.46	0.15000	199.41
339	0.05000	285.59	0.08000	285.59	1.00001	254.23	0.05000	222.87	0.05000	209.21	0.15000	195.55
340	0.05000	280.54	0.08000	280.54	1.00001	248.88	0.05000	217.23	0.05000	204.16	0.15000	191.09
341	0.05000	275.57	0.08000	275.57	1.00003	243.21	0.05000	210.85	0.05000	198.58	0.15000	186.31
342	0.05000	271.60	0.08000	271.60	1.00004	238.29	0.05000	204.97	0.05000	193.59	0.15000	182.20
343	0.05000	268.78	0.08000	268.78	1.00006	234.54	0.05000	200.30	0.05000	189.78	0.15000	179.26
344	0.05000	267.13	0.08001	267.13	1.00006	232.35	0.05000	197.56	0.05000	187.65	0.15000	177.75
345	0.05000	266.04	0.08001	266.04	1.00006	231.11	0.05000	196.18	0.05000	186.64	0.15000	177.09
346	0.05000	264.72	0.08000	264.72	1.00005	230.16	0.05000	195.61	0.05000	186.19	0.15000	176.77
347	0.05000	262.48	0.08000	262.48	1.00004	228.87	0.05000	195.27	0.05000	185.86	0.15000	176.45
348	0.05000	260.12	0.08000	260.12	1.00002	227.58	0.05000	195.05	0.05000	185.64	0.15000	176.23
349	0.05000	257.80	0.08000	257.80	1.00000	226.37	0.05000	194.94	0.05000	185.53	0.15000	176.11
377	0.05000	294.48	0.08000	294.48	1.00000	263.08	0.05000	231.69	0.05000	217.43	0.15000	203.17
378	0.05000	291.29	0.08000	291.29	1.00000	259.88	0.05000	228.46	0.05000	214.27	0.15000	200.08
379	0.05000	287.10	0.08000	287.10	1.00000	255.69	0.05000	224.29	0.05000	210.38	0.15000	196.48
380	0.05000	282.45	0.08000	282.45	1.00001	250.86	0.05000	219.28	0.05000	205.82	0.15000	192.36
381	0.05000	277.72	0.08000	277.72	1.00002	245.69	0.05000	213.66	0.05000	200.77	0.15000	187.88
382	0.05000	273.62	0.08000	273.62	1.00003	240.99	0.05000	208.36	0.05000	196.08	0.15000	183.80
383	0.05000	270.25	0.08000	270.25	1.00004	237.01	0.05000	203.78	0.05000	192.13	0.15000	180.48
384	0.05000	267.88	0.08000	267.88	1.00004	234.25	0.05000	200.62	0.05000	189.46	0.15000	178.30
385	0.05000	265.93	0.08000	265.93	1.00004	232.10	0.05000	198.27	0.05000	187.52	0.15000	176.77
386	0.05000	263.02	0.08000	263.02	1.00004	229.47	0.05000	195.92	0.05000	185.42	0.15000	174.91
387	0.05000	259.10	0.08000	259.10	1.00002	226.26	0.05000	193.42	0.05000	183.10	0.15000	172.77

388	0.05000	255.57	0.08000	255.57	1.00001	223.49	0.05000	191.41	0.05000	181.24	0.15000	171.07
389	0.05000	252.33	0.08000	252.33	1.00000	221.00	0.05000	189.67	0.05000	179.64	0.15000	169.62
417	0.05000	295.04	0.08000	295.04	1.00000	263.58	0.05000	232.11	0.05000	217.80	0.15000	203.48
418	0.05000	292.07	0.08000	292.07	1.00000	260.59	0.05000	229.12	0.05000	214.82	0.15000	200.53
419	0.05000	288.15	0.08000	288.15	1.00000	256.71	0.05000	225.28	0.05000	211.20	0.15000	197.12
420	0.05000	283.81	0.08000	283.81	1.00001	252.28	0.05000	220.76	0.05000	207.01	0.15000	193.25
421	0.05000	279.25	0.08000	279.25	1.00001	247.49	0.05000	215.73	0.05000	202.36	0.15000	188.99
422	0.05000	274.93	0.08000	274.93	1.00001	242.90	0.05000	210.88	0.05000	197.87	0.15000	184.87
423	0.05000	270.82	0.08000	270.82	1.00002	238.57	0.05000	206.33	0.05000	193.71	0.15000	181.08
424	0.05000	267.38	0.08000	267.38	1.00002	235.05	0.05000	202.72	0.05000	190.40	0.15000	178.09
425	0.05000	264.34	0.08000	264.34	1.00002	231.88	0.05000	199.42	0.05000	187.50	0.15000	175.57
426	0.05000	259.99	0.08000	259.99	1.00002	227.70	0.05000	195.41	0.05000	183.85	0.15000	172.28
427	0.05000	254.77	0.08000	254.77	1.00001	222.89	0.05000	191.02	0.05000	179.82	0.15000	168.62
428	0.05000	250.39	0.08000	250.39	1.00001	218.94	0.05000	187.48	0.05000	176.59	0.15000	165.70
429	0.05000	246.46	0.08000	246.46	1.00000	215.40	0.05000	184.35	0.05000	173.75	0.15000	163.14
457	0.05000	295.54	0.08000	295.54	1.00000	264.02	0.05000	232.49	0.05000	218.13	0.15000	203.76
458	0.05000	292.33	0.08000	292.33	1.00000	260.83	0.05000	229.34	0.05000	215.01	0.15000	200.68
459	0.05000	289.04	0.08000	289.04	1.00000	257.58	0.05000	226.12	0.05000	211.89	0.15000	197.67
460	0.05000	284.92	0.08000	284.92	1.00000	253.45	0.05000	221.98	0.05000	207.98	0.15000	193.98
461	0.05000	280.45	0.08000	280.45	1.00000	248.92	0.05000	217.38	0.05000	203.61	0.15000	189.84
462	0.05000	275.82	0.08000	275.82	1.00000	244.31	0.05000	212.80	0.05000	199.21	0.15000	185.61
463	0.05000	270.95	0.08000	270.95	1.00000	239.56	0.05000	208.18	0.05000	194.77	0.15000	181.36
464	0.05000	266.49	0.08000	266.49	1.00000	235.30	0.05000	204.11	0.05000	190.87	0.15000	177.62
465	0.05000	262.49	0.08000	262.49	1.00000	231.24	0.05000	200.00	0.05000	187.14	0.15000	174.27
466	0.05000	257.03	0.08000	257.03	1.00000	225.86	0.05000	194.68	0.05000	182.28	0.15000	169.87
467	0.05000	250.90	0.08000	250.90	1.00000	219.88	0.05000	188.86	0.05000	176.97	0.15000	165.08
468	0.05000	245.95	0.08000	245.95	1.00000	215.07	0.05000	184.18	0.05000	172.73	0.15000	161.27
469	0.05000	241.60	0.08000	241.60	1.00000	210.83	0.05000	180.05	0.05000	168.99	0.15000	157.93

OPTIMIZATION SYSTEM FOR TPSSYM = 4

TOTAL NUMBER OF DESIGN VARIABLES = 45
TOTAL NUMBER OF CONSTRAINS = 2462
TOTAL NUMBER OF TEMP. CONSTRAINS = 1122
TOTAL NUMBER OF TEMP. PRINTOUTS = 11

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



MAXIMUM TEMPERATURE OF EVERY LAYER

LAYER:	1	2	3	4	5	6
Tmax:	2300.33	2020.33	1800.33	2020.33	550.33	300.33
Optv:	406.90	406.90	281.78	281.78	250.88	250.88

VALUES OF DESIGN VARIABLES :

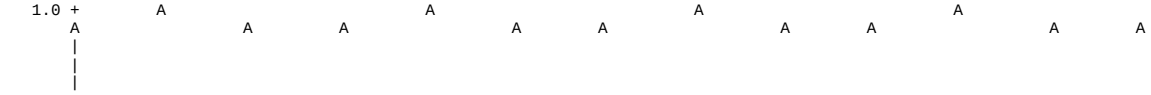
LAYER	DEV01	DEV02	DEV03	DEV04	DEV05	DEV06	DEV07	DEV08	DEV09
1	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000
2	0.08000	0.08000	0.08000	0.08000	0.08000	0.08000	0.08000	0.08000	0.08000
3	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
4	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000
5	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000

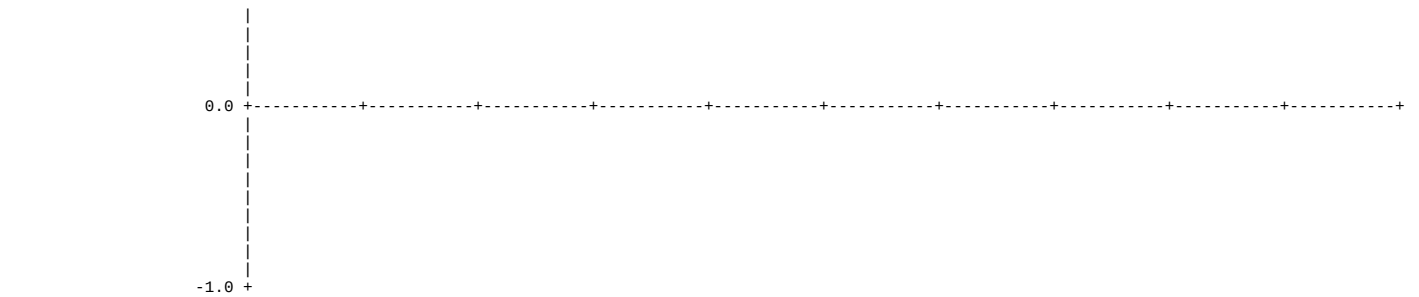
THE ORIGINAL OBJECTIVE FUNCTION = 499.9669800

THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.5028006

THE TOTAL OPTIMAL WEIGHT = 1.67899825E+05

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES





OPTIMAL STRUCTURES OF TPS FOR PATCH = 4
(WITH AVERAGE THICKNESS)

HRSI COAT	thin skin	0.05000 in.	406.9 F	
AB312 Fabric	slab	0.08000 in.	406.9 F	i
Q-Felt(3.5 PCF)	thin skin	1.00000 in.	281.8 F	
AB312 Fabric	slab	0.05000 in.	281.8 F	i
RTV-560	thin skin	0.05000 in.	250.9 F	
ALUMINUM 2024-T4	slab	0.15000 in.	250.9 F	i

THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH = 4

PANEL	LAYER01		LAYER02		LAYER03		LAYER04		LAYER05		LAYER06	
497	0.05000	390.69	0.08000	390.69	1.00000	321.27	0.05000	251.85	0.05000	237.86	0.15000	223.87
498	0.05000	376.57	0.08000	376.57	1.00000	313.60	0.05000	250.63	0.05000	234.27	0.15000	217.92
499	0.05000	370.58	0.08000	370.58	1.00000	305.16	0.05000	239.73	0.05000	224.80	0.15000	209.88
500	0.05000	360.42	0.08000	360.42	1.00000	295.46	0.05000	230.50	0.05000	216.16	0.15000	201.81
501	0.05000	346.60	0.08000	346.60	1.00000	284.20	0.05000	221.79	0.05000	207.42	0.15000	193.04
502	0.05000	331.35	0.08000	331.35	1.00000	272.14	0.05000	212.92	0.05000	198.61	0.15000	184.30
503	0.05000	316.01	0.08000	316.01	1.00000	260.39	0.05000	204.77	0.05000	190.63	0.15000	176.48
504	0.05000	302.84	0.08000	302.84	1.00000	250.62	0.05000	198.40	0.05000	184.47	0.15000	170.54
505	0.05000	290.47	0.08000	290.47	1.00000	241.69	0.05000	192.92	0.05000	179.27	0.15000	165.62
506	0.05000	273.98	0.08000	273.98	1.00000	230.18	0.05000	186.39	0.05000	173.20	0.15000	160.02
507	0.05000	256.19	0.08000	256.19	1.00000	218.26	0.05000	180.33	0.05000	167.77	0.15000	155.21
508	0.05000	242.54	0.08000	242.54	1.00000	209.45	0.05000	176.35	0.05000	164.36	0.15000	152.37
509	0.05000	230.88	0.08000	230.88	1.00000	202.15	0.05000	173.41	0.05000	161.97	0.15000	150.53
537	0.05000	383.84	0.08000	383.84	1.00000	320.65	0.05000	257.47	0.05000	241.40	0.15000	225.33
538	0.05000	371.97	0.08000	371.97	1.00000	315.26	0.05000	258.54	0.05000	239.51	0.15000	220.48
539	0.05000	366.35	0.08000	366.35	1.00000	308.59	0.05000	250.83	0.05000	232.11	0.15000	213.38
540	0.05000	358.19	0.08000	358.19	1.00000	299.12	0.05000	240.06	0.05000	222.39	0.15000	204.72
541	0.05000	345.49	0.08000	345.49	1.00000	288.53	0.05000	231.56	0.05000	213.77	0.15000	195.98
542	0.05000	330.81	0.08000	330.81	1.00001	278.16	0.05000	225.51	0.05000	206.76	0.15000	188.01
543	0.05000	315.78	0.08000	315.78	1.00001	267.25	0.05000	218.72	0.05000	199.55	0.15000	180.37
544	0.05000	302.45	0.08000	302.45	1.00001	257.28	0.05000	212.12	0.05000	193.08	0.15000	174.03
545	0.05000	289.44	0.08000	289.44	1.00001	246.86	0.05000	204.28	0.05000	186.13	0.15000	167.97
546	0.05000	271.63	0.08000	271.63	1.00001	232.88	0.05000	194.14	0.05000	177.40	0.15000	160.65
547	0.05000	251.95	0.08000	251.95	1.00000	217.83	0.05000	183.71	0.05000	168.74	0.15000	153.77
548	0.05000	236.64	0.08000	236.64	1.00000	206.31	0.05000	175.99	0.05000	162.59	0.15000	150.53
549	0.05000	230.88	0.08000	223.19	1.00000	196.33	0.05000	169.48	0.05000	157.57	0.15000	150.53
577	0.05000	378.93	0.08000	378.93	1.00000	320.50	0.05000	262.08	0.05000	244.36	0.15000	226.64
578	0.05000	369.25	0.08000	369.25	1.00000	316.81	0.05000	264.38	0.05000	243.52	0.15000	222.65
579	0.05000	363.87	0.08000	363.87	1.00001	311.52	0.05000	259.16	0.05000	237.82	0.15000	216.48
580	0.05000	356.20	0.08000	356.20	1.00001	303.83	0.05000	251.45	0.05000	230.11	0.15000	208.77
581	0.05000	344.75	0.08000	344.75	1.00001	294.83	0.05000	244.91	0.05000	222.83	0.15000	200.75
582	0.05000	331.40	0.08000	331.40	1.00001	285.39	0.05000	239.37	0.05000	216.27	0.15000	193.17
583	0.05000	317.25	0.08000	317.25	1.00001	274.81	0.05000	232.38	0.05000	208.99	0.15000	185.59
584	0.05000	304.29	0.08000	304.29	1.00001	264.62	0.05000	224.96	0.05000	201.96	0.15000	178.96
585	0.05000	291.07	0.08000	291.07	1.00001	253.54	0.05000	216.02	0.05000	194.12	0.15000	172.22
586	0.05000	272.44	0.08000	272.44	1.00001	237.91	0.05000	203.38	0.05000	183.46	0.15000	163.55
587	0.05000	251.40	0.08000	251.40	1.00001	220.32	0.05000	189.24	0.05000	172.02	0.15000	154.80
588	0.05000	234.84	0.08000	234.84	1.00000	206.49	0.05000	178.15	0.05000	163.35	0.15000	150.53
589	0.05000	230.88	0.08000	220.02	1.00000	194.14	0.05000	168.26	0.05000	155.82	0.15000	150.53
617	0.05000	375.29	0.08000	375.29	1.00000	320.74	0.05000	266.19	0.05000	247.07	0.15000	227.94
618	0.05000	367.72	0.08000	367.72	1.00000	318.46	0.05000	269.19	0.05000	246.98	0.15000	224.76
619	0.05000	362.64	0.08000	362.64	1.00001	314.25	0.05000	265.87	0.05000	242.68	0.15000	219.49
620	0.05000	355.52	0.08000	355.52	1.00001	308.17	0.05000	260.82	0.05000	236.86	0.15000	212.91
621	0.05000	345.40	0.08000	345.40	1.00001	300.77	0.05000	256.15	0.05000	231.04	0.15000	205.93
622	0.05000	333.66	0.08000	333.66	1.00002	292.50	0.05000	251.33	0.05000	225.25	0.15000	199.17
623	0.05000	320.94	0.08000	320.94	1.00002	282.78	0.05000	244.62	0.05000	218.39	0.15000	192.16
624	0.05000	309.03	0.08000	309.03	1.00002	273.07	0.05000	237.11	0.05000	211.44	0.15000	185.77
625	0.05000	296.45	0.08000	296.45	1.00002	262.23	0.05000	228.00	0.05000	203.50	0.15000	179.00
626	0.05000	278.32	0.08000	278.32	1.00001	246.30	0.05000	214.28	0.05000	192.04	0.15000	169.81
627	0.05000	257.46	0.08000	257.46	1.00001	227.71	0.05000	197.97	0.05000	178.99	0.15000	160.01

628	0.05000	240.87	0.08000	240.87	1.00000	212.75	0.05000	184.63	0.05000	168.65	0.15000	152.67
629	0.05000	230.88	0.08000	225.97	1.00000	199.19	0.05000	172.40	0.05000	159.41	0.15000	150.53
657	0.05000	372.93	0.08000	372.93	1.00000	321.37	0.05000	269.80	0.05000	249.51	0.15000	229.22
658	0.05000	367.29	0.08000	367.29	1.00000	320.12	0.05000	272.94	0.05000	249.84	0.15000	226.74
659	0.05000	362.53	0.08000	362.53	1.00001	316.85	0.05000	271.17	0.05000	246.81	0.15000	222.45
660	0.05000	356.09	0.08000	356.09	1.00001	312.12	0.05000	268.15	0.05000	242.62	0.15000	217.09
661	0.05000	347.45	0.08000	347.45	1.00002	306.18	0.05000	264.91	0.05000	238.14	0.15000	211.37
662	0.05000	337.55	0.08000	337.55	1.00002	299.13	0.05000	260.71	0.05000	233.22	0.15000	205.72
663	0.05000	326.78	0.08000	326.78	1.00002	290.67	0.05000	254.56	0.05000	227.15	0.15000	199.75
664	0.05000	316.65	0.08000	316.65	1.00002	282.12	0.05000	247.58	0.05000	220.88	0.15000	194.19
665	0.05000	305.84	0.08000	305.84	1.00002	272.52	0.05000	239.20	0.05000	213.69	0.15000	188.17
666	0.05000	290.18	0.08000	290.18	1.00002	258.16	0.05000	226.14	0.05000	202.95	0.15000	179.76
667	0.05000	272.10	0.08000	272.10	1.00001	241.05	0.05000	210.01	0.05000	190.23	0.15000	170.45
668	0.05000	257.67	0.08000	257.67	1.00001	227.10	0.05000	196.53	0.05000	179.88	0.15000	163.24
669	0.05000	245.07	0.08000	245.07	1.00000	214.61	0.05000	184.15	0.05000	170.65	0.15000	157.15
697	0.05000	371.81	0.08000	371.81	1.00000	322.36	0.05000	272.92	0.05000	251.69	0.15000	230.47
698	0.05000	367.68	0.08000	367.68	1.00000	321.59	0.05000	275.49	0.05000	251.94	0.15000	228.39
699	0.05000	363.17	0.08000	363.17	1.00001	318.74	0.05000	274.30	0.05000	249.50	0.15000	224.69
700	0.05000	357.46	0.08000	357.46	1.00001	315.04	0.05000	272.63	0.05000	246.57	0.15000	220.52
701	0.05000	350.27	0.08000	350.27	1.00002	310.37	0.05000	270.47	0.05000	243.35	0.15000	216.23
702	0.05000	342.39	0.08000	342.39	1.00002	304.70	0.05000	267.02	0.05000	239.56	0.15000	212.10
703	0.05000	334.01	0.08000	334.01	1.00002	297.88	0.05000	261.75	0.05000	234.70	0.15000	207.66
704	0.05000	326.32	0.08000	326.32	1.00002	291.05	0.05000	255.79	0.05000	229.64	0.15000	203.48
705	0.05000	317.78	0.08000	317.78	1.00002	283.13	0.05000	248.48	0.05000	223.51	0.15000	198.53
706	0.05000	305.74	0.08000	305.74	1.00001	271.42	0.05000	237.10	0.05000	214.37	0.15000	191.64
707	0.05000	292.28	0.08000	292.28	1.00001	257.67	0.05000	223.07	0.05000	203.55	0.15000	184.03
708	0.05000	281.77	0.08000	281.77	1.00000	246.57	0.05000	211.38	0.05000	194.74	0.15000	178.10
709	0.05000	273.54	0.08000	273.54	1.00000	237.36	0.05000	201.19	0.05000	187.33	0.15000	173.47
737	0.05000	371.94	0.08000	371.94	1.00000	323.80	0.05000	275.66	0.05000	253.71	0.15000	231.76
738	0.05000	368.90	0.08000	368.90	1.00000	323.28	0.05000	277.66	0.05000	253.92	0.15000	230.18
739	0.05000	364.74	0.08000	364.74	1.00001	320.93	0.05000	277.11	0.05000	252.24	0.15000	227.38
740	0.05000	359.94	0.08000	359.94	1.00001	318.06	0.05000	276.19	0.05000	250.31	0.15000	224.44
741	0.05000	354.32	0.08000	354.32	1.00001	314.38	0.05000	274.44	0.05000	248.02	0.15000	221.59
742	0.05000	348.51	0.08000	348.51	1.00002	309.93	0.05000	271.34	0.05000	245.14	0.15000	218.94
743	0.05000	342.61	0.08000	342.61	1.00002	304.74	0.05000	266.87	0.05000	241.46	0.15000	216.04
744	0.05000	337.51	0.08000	337.51	1.00002	299.78	0.05000	262.06	0.05000	237.69	0.15000	213.32
745	0.05000	332.05	0.08000	332.05	1.00001	294.25	0.05000	256.44	0.05000	233.24	0.15000	210.04
746	0.05000	324.89	0.08000	324.89	1.00001	286.37	0.05000	247.86	0.05000	226.68	0.15000	205.51
747	0.05000	317.53	0.08000	317.53	1.00001	277.50	0.05000	237.47	0.05000	218.99	0.15000	200.51
748	0.05000	312.24	0.08000	312.24	1.00000	270.63	0.05000	229.03	0.05000	212.84	0.15000	196.66
749	0.05000	309.62	0.08000	309.62	1.00000	266.08	0.05000	222.55	0.05000	208.44	0.15000	194.32
777	0.05000	373.54	0.08000	373.54	1.00000	325.79	0.05000	278.04	0.05000	255.59	0.15000	233.13
778	0.05000	370.99	0.08000	370.99	1.00000	325.10	0.05000	279.21	0.05000	255.60	0.15000	232.00
779	0.05000	367.20	0.08000	367.20	1.00001	323.04	0.05000	278.88	0.05000	254.47	0.15000	230.06
780	0.05000	363.26	0.08000	363.26	1.00001	320.68	0.05000	278.11	0.05000	253.18	0.15000	228.26
781	0.05000	359.05	0.08000	359.05	1.00001	317.71	0.05000	276.38	0.05000	251.56	0.15000	226.74
782	0.05000	355.09	0.08000	355.09	1.00001	314.32	0.05000	273.56	0.05000	249.51	0.15000	225.47
783	0.05000	351.53	0.08000	351.53	1.00001	310.75	0.05000	269.98	0.05000	247.03	0.15000	224.08
784	0.05000	348.94	0.08000	348.94	1.00001	307.70	0.05000	266.46	0.05000	244.63	0.15000	222.81
785	0.05000	346.47	0.08000	346.47	1.00001	304.55	0.05000	262.63	0.05000	241.89	0.15000	221.15
786	0.05000	344.05	0.08000	344.05	1.00001	300.57	0.05000	257.09	0.05000	238.03	0.15000	218.96
787	0.05000	342.62	0.08000	342.62	1.00001	296.71	0.05000	250.79	0.05000	233.70	0.15000	216.62
788	0.05000	342.37	0.08000	342.37	1.00000	294.16	0.05000	245.95	0.05000	230.42	0.15000	214.89
789	0.05000	344.94	0.08000	344.94	1.00000	294.13	0.05000	243.31	0.05000	229.07	0.15000	214.82
817	0.05000	376.73	0.08000	376.73	1.00000	328.31	0.05000	279.88	0.05000	257.20	0.15000	234.52
818	0.05000	374.01	0.08000	374.01	1.00000	327.05	0.05000	280.09	0.05000	256.97	0.15000	233.85
819	0.05000	370.52	0.08000	370.52	1.00001	325.06	0.05000	279.60	0.05000	256.17	0.15000	232.75
820	0.05000	367.26	0.08000	367.26	1.00001	322.93	0.05000	278.60	0.05000	255.27	0.15000	231.94
821	0.05000	364.10	0.08000	364.10	1.00001	320.40	0.05000	276.71	0.05000	254.12	0.15000	231.52
822	0.05000	361.60	0.08000	361.60	1.00001	317.91	0.05000	274.22	0.05000	252.82	0.15000	231.42
823	0.05000	359.99	0.08000	359.99	1.00001	315.79	0.05000	271.60	0.05000	251.45	0.15000	231.31
824	0.05000	359.49	0.08000	359.49	1.00001	314.43	0.05000	269.36	0.05000	250.30	0.15000	231.23
825	0.05000	359.41	0.08000	359.41	1.00001	313.30	0.05000	267.18	0.05000	249.01	0.15000	230.84
826	0.05000	360.67	0.08000	360.67	1.00001	312.51	0.05000	264.35	0.05000	247.38	0.15000	230.40
827	0.05000	363.67	0.08000	363.67	1.00000	312.59	0.05000	261.51	0.05000	245.75	0.15000	229.99
828	0.05000	366.97	0.08000	366.97	1.00000	313.26	0.05000	259.56	0.05000	244.64	0.15000	229.72
829	0.05000	373.43	0.08000	373.43	1.00000	316.72	0.05000	260.01	0.05000	245.70	0.15000	231.39
857	0.05000	381.56	0.08000	381.56	1.00000	331.35	0.05000	281.14	0.05000	258.52	0.15000	235.90
858	0.05000	378.06	0.08000	378.06	1.00000	329.16	0.05000	280.27	0.05000	258.00	0.15000	235.73
859	0.05000	374.68	0.08000	374.68	1.00000	326.99	0.05000	279.29	0.05000	257.36	0.15000	235.42
860	0.05000	371.72	0.08000	371.72	1.00000	324.80	0.05000	277.89	0.05000	256.65	0.15000	235.42
861	0.05000	369.12	0.08000	369.12	1.00000	322.52	0.05000	275.92	0.05000	255.88	0.15000	235.83
862	0.05000	367.56	0.08000	367.56	1.00000	320.73	0.05000	273.89	0.05000	255.22	0.15000	236.55
863	0.05000	367.34	0.08000	367.34	1.00000	319.79	0.05000	272.24	0.05000	254.80	0.15000	237.36
864	0.05000	368.36	0.08000	368.36	1.00000	319.77	0.05000	271.18	0.05000	254.65	0.15000	238.13
865	0.05000	369.91	0.08000	369.91	1.00000	320.14	0.05000	270.36	0.05000	254.45	0.15000	238.54
866	0.05000	373.58	0.08000	373.58	1.00000	321.61	0.05000	269.65	0.05000	254.42	0.15000	239.19
867	0.05000	379.40	0.08000	379.40	1.00000	324.37	0.05000	269.34	0.05000	254.63	0.15000	239.93
868	0.05000	384.90	0.08000	384.90	1.00000	327.15	0.05000	269.40	0.05000	254.95	0.15000	240.49
869	0.05000	393.92	0.08000	393.92	1.00000	332.96	0.05000	272.00	0.05000	257.66	0.15000	243.32
897	0.05000	388.03	0.08000	388.03	1.00000	334.91	0.05000	281.78	0.05000	259.53	0.15000	237.28
898	0.05000	383.21	0.08000	383.21	1.00000	331.44	0.05000	279.66	0.05000	258.66	0.15000	237.66
899	0.05000	379.59	0.08000	379.59	1.00000	328.80	0.05000	278.01	0.05000	258.03	0.15000	238.04
900	0.05000	376.37	0.08000	376.37	1.00000	326.33	0.05000	276.28	0.05000	257.45	0.15000	238.62
901	0.05000	373.76	0.08000	373.76	1.00000	324.13	0.05000	274.49	0.05000	257.01	0.15000	239.53
902	0.05000	372.59	0.08000	372.59	1.00000	322.84	0.05000	273.09	0.05000	256.90	0.15000	240.71
903	0.05000	373.17	0.08000	373.17	1.00000	322.76	0.05000	272.35	0.05000	257.19	0.15000	242.03
904	0.05000	375.10	0.08000	375.10	1.00000	323.67	0.05000	272.25	0.05000	257.77	0.15000	243.28
905	0.05000	377.57	0.08000	377.57	1.00000	325.01	0.05000	272.46	0.05000	258.28	0.15000	244.11
906	0.05000	382.55	0.08000	382.55	1.00000	327.87	0.05000	273.19	0.05000	259.22	0.15000	245.25
907	0.05000	389.86	0.08000	389.86	1.00000	332.18	0.05000	274.49	0.05000	260.50	0.15000	246.52
908	0.05000	396.54	0.08000	396.54	1.00000	336.15	0.05000	275.77	0.05000	261.63	0.15000	247.49
909	0.05000	406.90	0.08000	406.90	1.00000	343.24	0.05000	279.58	0.05000	265.23	0.15000	250.88

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                  OPTIMIZATION SYSTEM FOR TPSSYM =     5


 TOTAL NUMBER OF DESIGN VARIABLES =   45
 TOTAL NUMBER OF CONSTRAINS       = 2324
 TOTAL NUMBER OF TEMP. CONSTRAINS =  594
 TOTAL NUMBER OF TEMP. PRINTOUTS  =   11


MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
    X   0.5197E+03
   1.0 B
       |           B
       |
       |                       B           B
       D           D           D           D           B           B
       F           F           F           F           F           F           D           D           B
       |                                                                       F                                   B
       |                                                                                   F           D           D
       |                                                                                               F           F
       |
   0.0 +-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+
       |
       |
       |
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       |
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       |
       |
       |
  -1.0 +
       .10         .20         .30         .40         .50         .60         .70         .80         .90         1.00      1.10
                                                                 TIME  ( X 1.401E-44 )


              MAXIMUM TEMPERATURE OF EVERY LAYER
LAYER:        1        2        3        4        5        6
Tmax:   2300.33  2020.33  1800.33  2020.33   550.33   300.33
Optv:    519.75   519.75   301.98   301.98   264.86   264.86

                   VALUES OF DESIGN VARIABLES :
LAYER    DEV01    DEV02    DEV03    DEV04    DEV05    DEV06    DEV07    DEV08    DEV09
    1  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000
    2  0.08000  0.08000  0.08000  0.08000  0.08000  0.08000  0.08000  0.08000  0.08000
    3  1.00000  1.00000  1.00000  1.00000  1.00000  1.00000  1.00000  1.00000  1.00000
    4  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000
    5  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000

 THE ORIGINAL OBJECTIVE FUNCTION =     636.2790527

 THE RATIO OF OPTIMAL OBJECTIVE FUNCTION =   0.5028189

 THE TOTAL OPTIMAL WEIGHT = 4.39993838E+05


MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
    X   0.5028E+00
   1.0 A
       |
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       |
       |
       |
       |
       |
       |
       |
   0.0 +-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+
       |
       |
       |
       |
       |
       |
       |
       |
       |
  -1.0 +
       1.00        1.10        1.20        1.30        1.40        1.50        1.60        1.70        1.80        1.90      2.00
                                                                 TIME  ( X 0.000E+00 )


              OPTIMAL STRUCTURES OF TPS FOR PATCH =       5
                    (WITH AVERAGE THICKNESS)
 ============================================================   -----
                      HRSI COAT           thin skin             0.05000 in.   519.7 F
 ============================================================   -----
                                                                  i
                      AB312 Fabric        slab                  0.08000 in.   519.7 F
                                                                  i
 ============================================================   -----
                      Q-Felt(3.5 PCF)     thin skin             0.99998 in.   302.0 F
 ============================================================   -----
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AB312 Fabric	slab	0.05000 in.	302.0 F
RTV-560	thin skin	0.05000 in.	264.9 F
ALUMINUM 2024-T4	slab	0.15000 in.	264.9 F

THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH = 5

PANEL	LAYER01		LAYER02		LAYER03		LAYER04		LAYER05		LAYER06	
937	0.05000	519.75	0.08000	519.75	1.00000	410.87	0.05000	301.98	0.05000	279.26	0.15000	256.54
938	0.05000	497.92	0.08000	497.92	1.00000	398.66	0.05000	299.39	0.05000	277.12	0.15000	254.86
939	0.05000	479.63	0.08000	479.63	1.00000	388.36	0.05000	297.10	0.05000	275.27	0.15000	253.44
940	0.05000	460.33	0.08000	460.33	1.00000	377.45	0.05000	294.57	0.05000	273.24	0.15000	251.91
941	0.05000	439.75	0.08000	439.75	1.00000	365.71	0.05000	291.66	0.05000	270.97	0.15000	250.28
942	0.05000	421.53	0.08000	421.53	1.00000	355.15	0.05000	288.78	0.05000	268.81	0.15000	248.83
943	0.05000	407.70	0.08000	407.70	1.00000	346.95	0.05000	286.19	0.05000	266.96	0.15000	247.72
944	0.05000	399.44	0.08000	399.44	1.00000	341.82	0.05000	284.20	0.05000	265.63	0.15000	247.06
945	0.05000	399.44	0.08000	394.94	1.00000	338.68	0.05000	282.41	0.05000	264.51	0.15000	246.60
946	0.05000	399.44	0.08000	393.77	1.00000	337.07	0.05000	280.36	0.05000	263.36	0.15000	246.35
947	0.05000	399.44	0.08000	398.47	1.00000	338.55	0.05000	278.63	0.05000	262.59	0.15000	246.54
948	0.05000	405.73	0.08000	405.73	1.00000	341.69	0.05000	277.64	0.05000	262.31	0.15000	246.97
949	0.05000	413.54	0.08000	413.54	1.00000	345.50	0.05000	277.47	0.05000	262.68	0.15000	247.90
977	0.05000	519.40	0.08000	519.40	1.00000	410.69	0.05000	301.98	0.05000	279.31	0.15000	256.65
978	0.05000	497.49	0.08000	497.49	1.00000	398.41	0.05000	299.32	0.05000	277.17	0.15000	255.01
979	0.05000	479.33	0.08000	479.33	1.00000	388.13	0.05000	296.93	0.05000	275.27	0.15000	253.60
980	0.05000	460.41	0.08000	460.41	0.99999	377.35	0.05000	294.29	0.05000	273.15	0.15000	252.01
981	0.05000	440.26	0.08000	440.26	0.99999	365.76	0.05000	291.26	0.05000	270.77	0.15000	250.27
982	0.05000	422.44	0.08000	422.44	0.99999	355.35	0.05000	288.26	0.05000	268.48	0.15000	248.69
983	0.05000	408.91	0.08000	408.91	0.99999	347.23	0.05000	285.55	0.05000	266.50	0.15000	247.46
984	0.05000	400.78	0.08000	400.78	0.99999	342.13	0.05000	283.48	0.05000	265.08	0.15000	246.68
985	0.05000	399.44	0.08000	396.25	0.99999	338.96	0.05000	281.66	0.05000	263.90	0.15000	246.14
986	0.05000	399.44	0.08000	394.84	0.99999	337.22	0.05000	279.60	0.05000	262.70	0.15000	245.79
987	0.05000	399.44	0.08000	399.11	0.99999	338.49	0.05000	277.86	0.05000	261.87	0.15000	245.89
988	0.05000	405.92	0.08000	405.92	1.00000	341.40	0.05000	276.88	0.05000	261.57	0.15000	246.25
989	0.05000	413.39	0.08000	413.39	1.00000	345.05	0.05000	276.71	0.05000	261.92	0.15000	247.13
1017	0.05000	518.70	0.08000	518.70	1.00000	410.33	0.05000	301.97	0.05000	279.42	0.15000	256.86
1018	0.05000	496.68	0.08000	496.68	1.00000	397.94	0.05000	299.19	0.05000	277.25	0.15000	255.30
1019	0.05000	478.81	0.08000	478.81	0.99999	387.72	0.05000	296.63	0.05000	275.26	0.15000	253.89
1020	0.05000	460.54	0.08000	460.54	0.99998	377.17	0.05000	293.80	0.05000	272.99	0.15000	252.18
1021	0.05000	441.18	0.08000	441.18	0.99998	365.88	0.05000	290.57	0.05000	270.41	0.15000	250.25
1022	0.05000	424.08	0.08000	424.08	0.99997	355.71	0.05000	287.35	0.05000	267.90	0.15000	248.46
1023	0.05000	411.08	0.08000	411.08	0.99997	347.76	0.05000	284.44	0.05000	265.72	0.15000	247.00
1024	0.05000	403.18	0.08000	403.18	0.99997	342.70	0.05000	282.23	0.05000	264.13	0.15000	246.02
1025	0.05000	399.44	0.08000	398.63	0.99997	339.48	0.05000	280.33	0.05000	262.82	0.15000	245.32
1026	0.05000	399.44	0.08000	396.84	0.99997	337.52	0.05000	278.20	0.05000	261.49	0.15000	244.77
1027	0.05000	400.33	0.08000	400.33	0.99998	338.38	0.05000	276.43	0.05000	260.55	0.15000	244.67
1028	0.05000	406.31	0.08000	406.31	0.99999	340.88	0.05000	275.45	0.05000	260.17	0.15000	244.89
1029	0.05000	413.10	0.08000	413.10	1.00000	344.18	0.05000	275.26	0.05000	260.46	0.15000	245.65
1057	0.05000	517.45	0.08000	517.45	1.00000	409.70	0.05000	301.95	0.05000	279.60	0.15000	257.24
1058	0.05000	495.51	0.08000	495.51	0.99999	397.26	0.05000	299.01	0.05000	277.37	0.15000	255.74
1059	0.05000	478.16	0.08000	478.16	0.99998	387.20	0.05000	296.24	0.05000	275.26	0.15000	254.28
1060	0.05000	460.77	0.08000	460.77	0.99997	376.98	0.05000	293.18	0.05000	272.80	0.15000	252.41
1061	0.05000	442.43	0.08000	442.43	0.99996	366.06	0.05000	289.70	0.05000	269.97	0.15000	250.24
1062	0.05000	426.25	0.08000	426.25	0.99995	356.23	0.05000	286.21	0.05000	267.19	0.15000	248.18
1063	0.05000	413.92	0.08000	413.92	0.99994	348.49	0.05000	283.05	0.05000	264.74	0.15000	246.42
1064	0.05000	406.34	0.08000	406.34	0.99994	343.50	0.05000	280.66	0.05000	262.93	0.15000	245.20
1065	0.05000	401.78	0.08000	401.78	0.99994	340.21	0.05000	278.63	0.05000	261.45	0.15000	244.27
1066	0.05000	399.57	0.08000	399.57	0.99995	337.97	0.05000	276.38	0.05000	259.90	0.15000	243.43
1067	0.05000	402.05	0.08000	402.05	0.99997	338.28	0.05000	274.51	0.05000	258.77	0.15000	243.03
1068	0.05000	406.91	0.08000	406.91	0.99998	340.20	0.05000	273.49	0.05000	258.26	0.15000	243.03
1069	0.05000	412.69	0.08000	412.69	1.00000	342.97	0.05000	273.25	0.05000	258.42	0.15000	243.60
1097	0.05000	515.57	0.08000	515.57	1.00000	408.74	0.05000	301.92	0.05000	279.87	0.15000	257.82
1098	0.05000	494.11	0.08000	494.11	0.99999	396.45	0.05000	298.78	0.05000	277.53	0.15000	256.28
1099	0.05000	477.50	0.08000	477.50	0.99997	386.66	0.05000	295.82	0.05000	275.27	0.15000	254.71
1100	0.05000	461.09	0.08000	461.09	0.99996	376.81	0.05000	292.54	0.05000	272.60	0.15000	252.67
1101	0.05000	443.89	0.08000	443.89	0.99994	366.33	0.05000	288.76	0.05000	269.51	0.15000	250.25
1102	0.05000	428.78	0.07999	428.78	0.99992	356.88	0.05000	284.97	0.05000	266.43	0.15000	247.88
1103	0.05000	417.24	0.07999	417.24	0.99992	349.39	0.05000	281.55	0.05000	263.68	0.15000	245.81
1104	0.05000	410.05	0.07999	410.05	0.99991	344.49	0.05000	278.93	0.05000	261.61	0.15000	244.29
1105	0.05000	405.55	0.07999	405.55	0.99992	341.14	0.05000	276.73	0.05000	259.91	0.15000	243.09
1106	0.05000	402.89	0.07999	402.89	0.99993	338.58	0.05000	274.27	0.05000	258.08	0.15000	241.88
1107	0.05000	404.19	0.08000	404.19	0.99995	338.21	0.05000	272.24	0.05000	256.66	0.15000	241.07
1108	0.05000	407.71	0.08000	407.71	0.99998	339.42	0.05000	271.12	0.05000	255.96	0.15000	240.79
1109	0.05000	412.17	0.08000	412.17	1.00000	341.46	0.05000	270.75	0.05000	255.90	0.15000	241.05
1137	0.05000	513.16	0.08000	513.16	1.00000	407.52	0.05000	301.88	0.05000	280.23	0.15000	258.57
1138	0.05000	492.62	0.08000	492.62	0.99998	395.58	0.05000	298.55	0.05000	277.72	0.15000	256.89
1139	0.05000	476.90	0.08000	476.90	0.99996	386.15	0.05000	295.40	0.05000	275.29	0.15000	255.18
1140	0.05000	461.51	0.08000	461.51	0.99994	376.70	0.05000	291.89	0.05000	272.43	0.15000	252.96
1141	0.05000	445.55	0.07999	445.55	0.99992	366.69	0.05000	287.83	0.05000	269.06	0.15000	250.29
1142	0.05000	431.62	0.07999	431.62	0.99990	357.68	0.05000	283.73	0.05000	265.67	0.15000	247.61
1143	0.05000	420.96	0.07999	420.96	0.99989	350.49	0.05000	280.01	0.05000	262.60	0.15000	245.19
1144	0.05000	414.22	0.07999	414.22	0.99989	345.69	0.05000	277.16	0.05000	260.26	0.15000	243.37
1145	0.05000	409.82	0.07999	409.82	0.99989	342.29	0.05000	274.75	0.05000	258.30	0.15000	241.86
1146	0.05000	406.71	0.07999	406.71	0.99990	339.38	0.05000	272.04	0.05000	256.13	0.15000	240.22
1147	0.05000	406.69	0.07999	406.69	0.99994	338.23	0.05000	269.77	0.05000	254.35	0.15000	238.94
1148	0.05000	408.68	0.08000	408.68	0.99997	338.59	0.05000	268.49	0.05000	253.39	0.15000	238.29
1149	0.05000	411.55	0.08000	411.55	1.00000	339.73	0.05000	267.91	0.05000	253.03	0.15000	238.16
1177	0.05000	510.41	0.08000	510.41	1.00000	406.13	0.05000	301.84	0.05000	280.64	0.15000	259.43
1178	0.05000	491.10	0.08000	491.10	0.99998	394.70	0.05000	298.31	0.05000	277.92	0.15000	257.54

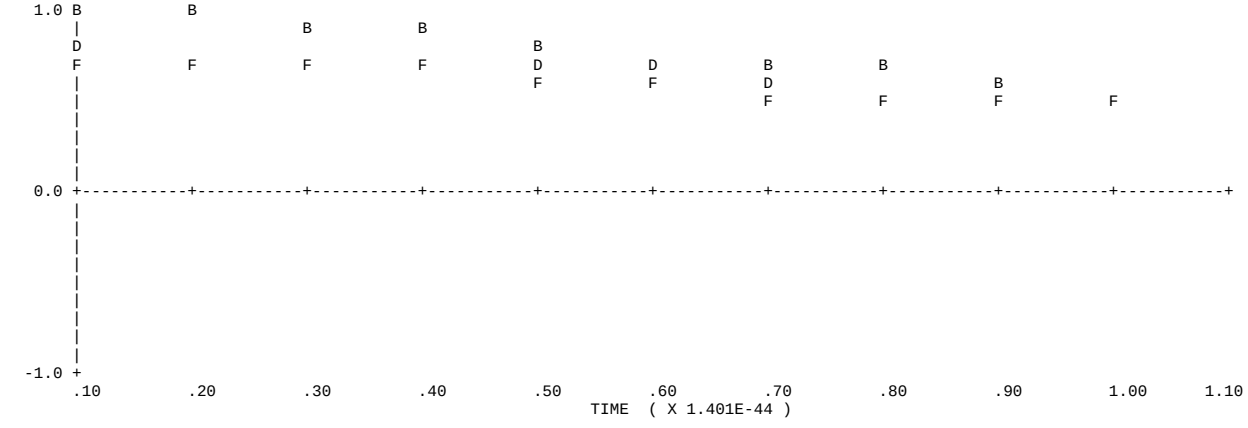
1179	0.05000	476.35	0.08000	476.35	0.99995	385.68	0.05000	295.01	0.05000	275.34	0.15000	255.67
1180	0.05000	462.03	0.07999	462.03	0.99993	376.66	0.05000	291.29	0.05000	272.29	0.15000	253.28
1181	0.05000	447.36	0.07999	447.36	0.99990	367.15	0.05000	286.95	0.05000	268.66	0.15000	250.37
1182	0.05000	434.67	0.07999	434.67	0.99988	358.62	0.05000	282.56	0.05000	264.97	0.15000	247.38
1183	0.05000	424.94	0.07999	424.94	0.99986	351.76	0.05000	278.58	0.05000	261.61	0.15000	244.64
1184	0.05000	418.68	0.07999	418.68	0.99986	347.09	0.05000	275.50	0.05000	259.00	0.15000	242.51
1185	0.05000	414.39	0.07999	414.39	0.99986	343.64	0.05000	272.89	0.05000	256.79	0.15000	240.69
1186	0.05000	410.83	0.07999	410.83	0.99988	340.37	0.05000	269.91	0.05000	254.26	0.15000	238.62
1187	0.05000	409.42	0.07999	409.42	0.99992	338.39	0.05000	267.35	0.05000	252.09	0.15000	236.83
1188	0.05000	409.77	0.08000	409.77	0.99996	337.82	0.05000	265.87	0.05000	250.83	0.15000	235.79
1189	0.05000	410.88	0.08000	410.88	1.00000	337.94	0.05000	265.00	0.05000	250.11	0.15000	235.22
1217	0.05000	507.52	0.08000	507.52	1.00000	404.66	0.05000	301.79	0.05000	281.06	0.15000	260.33
1218	0.05000	489.60	0.08000	489.60	0.99997	393.84	0.05000	298.09	0.05000	278.14	0.15000	258.20
1219	0.05000	475.88	0.08000	475.88	0.99994	385.27	0.05000	294.65	0.05000	275.41	0.15000	256.17
1220	0.05000	462.63	0.07999	462.63	0.99991	376.69	0.05000	290.76	0.05000	272.19	0.15000	253.62
1221	0.05000	449.25	0.07999	449.25	0.99988	367.72	0.05000	286.19	0.05000	268.34	0.15000	250.49
1222	0.05000	437.81	0.07999	437.81	0.99985	359.69	0.05000	281.57	0.05000	264.40	0.15000	247.24
1223	0.05000	428.99	0.07999	428.99	0.99984	353.18	0.05000	277.37	0.05000	260.79	0.15000	244.20
1224	0.05000	423.18	0.07999	423.18	0.99983	348.65	0.05000	274.12	0.05000	257.96	0.15000	241.80
1225	0.05000	418.99	0.07999	418.99	0.99984	345.17	0.05000	271.35	0.05000	255.53	0.15000	239.72
1226	0.05000	414.95	0.07999	414.95	0.99986	341.54	0.05000	268.14	0.05000	252.70	0.15000	237.25
1227	0.05000	412.16	0.07999	412.16	0.99991	338.73	0.05000	265.30	0.05000	250.15	0.15000	235.00
1228	0.05000	410.88	0.08000	410.88	0.99995	337.22	0.05000	263.56	0.05000	248.57	0.15000	233.58
1229	0.05000	410.22	0.08000	410.22	1.00000	336.30	0.05000	262.38	0.05000	247.48	0.15000	232.58
1257	0.05000	504.70	0.08000	504.70	1.00000	403.22	0.05000	301.74	0.05000	281.46	0.15000	261.19
1258	0.05000	488.18	0.08000	488.18	0.99997	393.03	0.05000	297.89	0.05000	278.36	0.15000	258.83
1259	0.05000	475.48	0.07999	475.48	0.99994	384.92	0.05000	294.35	0.05000	275.50	0.15000	256.66
1260	0.05000	463.28	0.07999	463.28	0.99990	376.80	0.05000	290.32	0.05000	272.15	0.15000	253.98
1261	0.05000	451.16	0.07999	451.16	0.99987	368.37	0.05000	285.59	0.05000	268.13	0.15000	250.67
1262	0.05000	440.88	0.07999	440.88	0.99984	360.85	0.05000	280.82	0.05000	264.01	0.15000	247.20
1263	0.05000	432.90	0.07999	432.90	0.99982	354.69	0.05000	276.49	0.05000	260.21	0.15000	243.93
1264	0.05000	427.49	0.07999	427.49	0.99982	350.31	0.05000	273.13	0.05000	257.23	0.15000	241.32
1265	0.05000	423.33	0.07999	423.33	0.99983	346.80	0.05000	270.26	0.05000	254.65	0.15000	239.04
1266	0.05000	418.80	0.07999	418.80	0.99985	342.85	0.05000	266.90	0.05000	251.58	0.15000	236.26
1267	0.05000	414.73	0.07999	414.73	0.99990	339.27	0.05000	263.82	0.05000	248.73	0.15000	233.64
1268	0.05000	411.96	0.08000	411.96	0.99995	336.89	0.05000	261.82	0.05000	246.84	0.15000	231.87
1269	0.05000	409.64	0.08000	409.64	1.00000	334.97	0.05000	260.30	0.05000	245.40	0.15000	230.50
1297	0.05000	501.90	0.08000	501.90	1.00000	401.79	0.05000	301.68	0.05000	281.85	0.15000	262.03
1298	0.05000	486.75	0.08000	486.75	0.99996	392.23	0.05000	297.70	0.05000	278.59	0.15000	259.48
1299	0.05000	475.11	0.07999	475.11	0.99993	384.60	0.05000	294.08	0.05000	275.62	0.15000	257.17
1300	0.05000	464.03	0.07999	464.03	0.99989	376.99	0.05000	289.96	0.05000	272.16	0.15000	254.37
1301	0.05000	453.19	0.07999	453.19	0.99985	369.16	0.05000	285.13	0.05000	268.02	0.15000	250.91
1302	0.05000	444.08	0.07999	444.08	0.99982	362.19	0.05000	280.30	0.05000	263.78	0.15000	247.27
1303	0.05000	436.90	0.07998	436.90	0.99981	356.41	0.05000	275.93	0.05000	259.88	0.15000	243.83
1304	0.05000	431.82	0.07998	431.82	0.99981	352.18	0.05000	272.54	0.05000	256.81	0.15000	241.07
1305	0.05000	427.58	0.07999	427.58	0.99982	348.60	0.05000	269.62	0.05000	254.12	0.15000	238.62
1306	0.05000	422.42	0.07999	422.42	0.99985	344.28	0.05000	266.13	0.05000	250.86	0.15000	235.60
1307	0.05000	417.06	0.07999	417.06	0.99990	339.93	0.05000	262.81	0.05000	247.73	0.15000	232.65
1308	0.05000	412.84	0.08000	412.84	0.99995	336.68	0.05000	260.52	0.05000	245.55	0.15000	230.58
1309	0.05000	409.12	0.08000	409.12	1.00000	333.93	0.05000	258.73	0.05000	243.84	0.15000	229.20
1337	0.05000	498.35	0.08000	498.35	1.00000	399.97	0.05000	301.59	0.05000	282.33	0.15000	263.06
1338	0.05000	484.87	0.08000	484.87	0.99996	391.17	0.05000	297.47	0.05000	278.91	0.15000	260.34
1339	0.05000	474.68	0.07999	474.68	0.99992	384.23	0.05000	293.78	0.05000	275.83	0.15000	257.88
1340	0.05000	465.14	0.07999	465.14	0.99988	377.38	0.05000	289.63	0.05000	272.28	0.15000	254.94
1341	0.05000	455.90	0.07999	455.90	0.99984	370.36	0.05000	284.83	0.05000	268.08	0.15000	251.33
1342	0.05000	448.05	0.07999	448.05	0.99981	364.04	0.05000	280.04	0.05000	263.78	0.15000	247.53
1343	0.05000	441.62	0.07998	441.62	0.99980	358.67	0.05000	275.72	0.05000	259.83	0.15000	243.93
1344	0.05000	436.70	0.07998	436.70	0.99980	354.53	0.05000	272.37	0.05000	256.70	0.15000	241.04
1345	0.05000	432.22	0.07999	432.22	0.99982	350.84	0.05000	269.46	0.05000	253.96	0.15000	238.46
1346	0.05000	426.24	0.07999	426.24	0.99985	346.07	0.05000	265.89	0.05000	250.57	0.15000	235.26
1347	0.05000	419.43	0.07999	419.43	0.99990	340.87	0.05000	262.31	0.05000	247.17	0.15000	232.03
1348	0.05000	413.73	0.08000	413.73	0.99995	336.70	0.05000	259.67	0.05000	244.68	0.15000	229.68
1349	0.05000	408.63	0.08000	408.63	1.00000	333.08	0.05000	257.53	0.05000	242.66	0.15000	229.20
1377	0.05000	491.72	0.08000	491.72	1.00000	396.54	0.05000	301.36	0.05000	283.11	0.15000	264.86
1378	0.05000	481.67	0.08000	481.67	0.99995	389.42	0.05000	297.17	0.05000	279.49	0.15000	261.81
1379	0.05000	474.18	0.07999	474.18	0.99991	383.86	0.05000	293.54	0.05000	276.32	0.15000	259.10
1380	0.05000	467.15	0.07999	467.15	0.99988	378.35	0.05000	289.55	0.05000	272.74	0.15000	255.93
1381	0.05000	460.10	0.07999	460.10	0.99984	372.56	0.05000	285.03	0.05000	268.59	0.15000	252.15
1382	0.05000	453.65	0.07999	453.65	0.99982	367.12	0.05000	280.60	0.05000	264.43	0.15000	248.27
1383	0.05000	447.74	0.07998	447.74	0.99981	362.17	0.05000	276.59	0.05000	260.61	0.15000	244.63
1384	0.05000	442.68	0.07999	442.68	0.99982	358.03	0.05000	273.39	0.05000	257.54	0.15000	241.68
1385	0.05000	437.65	0.07999	437.65	0.99983	354.07	0.05000	270.49	0.05000	254.75	0.15000	239.02
1386	0.05000	430.46	0.07999	430.46	0.99987	348.60	0.05000	266.73	0.05000	251.17	0.15000	235.61
1387	0.05000	421.93	0.07999	421.93	0.99991	342.32	0.05000	262.71	0.05000	247.39	0.15000	232.07
1388	0.05000	414.67	0.08000	414.67	0.99996	337.11	0.05000	259.54	0.05000	244.47	0.15000	229.39
1389	0.05000	408.13	0.08000	408.13	1.00000	332.47	0.05000	256.82	0.05000	242.00	0.15000	229.20
1417	0.05000	482.85	0.08000	482.85	1.00000	391.75	0.05000	300.65	0.05000	283.11	0.15000	264.86
1418	0.05000	478.55	0.08000	478.55	0.99996	387.90	0.05000	297.26	0.05000	280.30	0.15000	263.34
1419	0.05000	475.03	0.07999	475.03	0.99993	384.73	0.05000	294.43	0.05000	277.53	0.15000	260.63
1420	0.05000	471.14	0.07999	471.14	0.99990	381.24	0.05000	291.34	0.05000	274.47	0.15000	257.61
1421	0.05000	466.35	0.07999	466.35	0.99988	377.05	0.05000	287.75	0.05000	270.90	0.15000	254.05
1422	0.05000	460.88	0.07999	460.88	0.99987	372.46	0.05000	284.05	0.05000	267.21	0.15000	250.38
1423	0.05000	454.91	0.07999	454.91	0.99987	367.67	0.05000	280.43	0.05000	263.65	0.15000	246.86
1424	0.05000	449.24	0.07999	449.24	0.99988	363.25	0.05000	277.27	0.05000	260.59	0.15000	243.91
1425	0.05000	443.37	0.07999	443.37	0.99989	358.77	0.05000	274.18	0.05000	257.66	0.15000	241.14
1426	0.05000	434.74	0.07999	434.74	0.99991	352.29	0.05000	269.84	0.05000	253.64	0.15000	237.44
1427	0.05000	424.37	0.08000	424.37	0.99995	344.61	0.05000	264.85	0.05000	249.13	0.15000	233.41
1428	0.05000	415.57	0.08000	415.57	0.99997	338.14	0.05000	260.71	0.05000	245.47	0.15000	230.23
1429	0.05000	407.64	0.08000	407.64	1.00000	332.32	0.05000	257.01	0.05000	242.26	0.15000	229.20
1457	0.05000	483.12	0.08000	483.12	1.00000	391.28	0.05000	299.44	0.05000	281.71	0.15000	263.97
1458	0.05000	481.41	0.08000	481.41	1.00000	390.09	0.05000	298.78	0.05000	280.68	0.15000	262.58
1459	0.05000	479.45	0.08000	479.45	1.00000	388.69	0.05000	297.93	0.05000	279.57	0.15000	261.20
1460	0.05000	476.65	0.08000	476.65	1.00000	386.64	0.05000	296.64	0.05000	278.03	0.15000	259.43
1461	0.05000	472.43	0.08000	472.43	1.00000	383.50	0.05000	294.56	0.05000	275.80	0.15000	257.03
1462	0.05000	466.90	0.08000	466.90	1.00000	379.31	0.05000	291.72	0.05000	272.94	0.15000	254.16

1463	0.05000	460.38	0.08000	460.38	1.00000	374.33	0.05000	288.27	0.05000	269.65	0.15000	251.02
1464	0.05000	454.03	0.08000	454.03	1.00000	369.43	0.05000	284.83	0.05000	266.48	0.15000	248.13
1465	0.05000	447.42	0.08000	447.42	1.00000	364.31	0.05000	281.20	0.05000	263.22	0.15000	245.25
1466	0.05000	437.70	0.08000	437.70	1.00000	356.74	0.05000	275.79	0.05000	258.48	0.15000	241.17
1467	0.05000	426.04	0.08000	426.04	1.00000	347.62	0.05000	269.21	0.05000	252.84	0.15000	236.47
1468	0.05000	416.20	0.08000	416.20	1.00000	339.91	0.05000	263.61	0.05000	248.12	0.15000	232.62
1469	0.05000	407.28	0.08000	407.28	1.00000	332.89	0.05000	258.50	0.05000	243.85	0.15000	229.20

OPTIMIZATION SYSTEM FOR TPSSYM = 6

TOTAL NUMBER OF DESIGN VARIABLES = 20
TOTAL NUMBER OF CONSTRAINS = 774
TOTAL NUMBER OF TEMP. CONSTRAINS = 264
TOTAL NUMBER OF TEMP. PRINTOUTS = 11

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



MAXIMUM TEMPERATURE OF EVERY LAYER

LAYER:	1	2	3	4	5	6
Tmax:	2300.33	2020.33	1800.33	2020.33	550.33	300.33
Optv:	228.68	228.68	176.35	176.35	156.91	156.91

VALUES OF DESIGN VARIABLES :

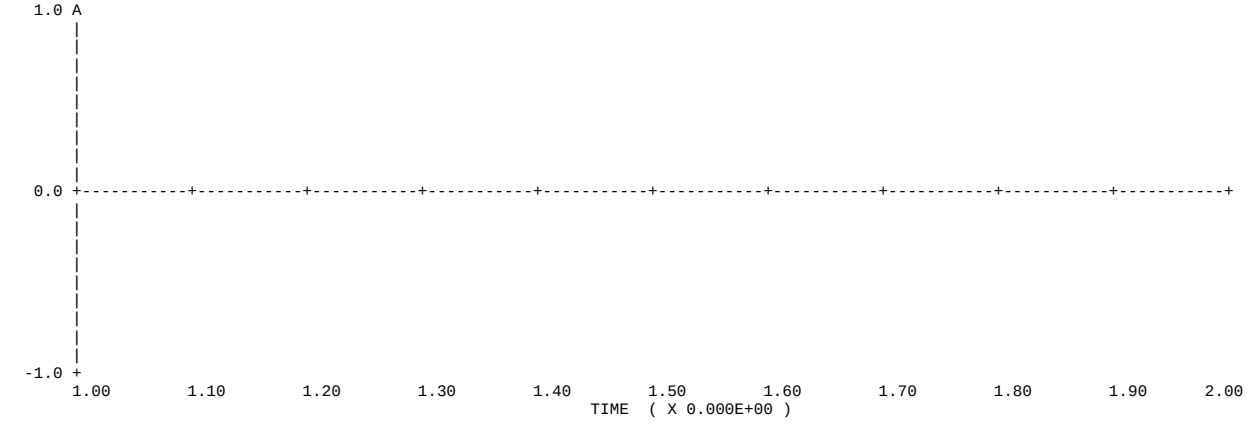
LAYER	DEV01	DEV02	DEV03	DEV04
1	0.05000	0.05000	0.05000	0.05000
2	0.08000	0.08000	0.08000	0.08000
3	1.00000	1.00000	1.00000	1.00000
4	0.05000	0.05000	0.05000	0.05000
5	0.05000	0.05000	0.05000	0.05000

THE ORIGINAL OBJECTIVE FUNCTION = 192.2937622

THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.5028006

THE TOTAL OPTIMAL WEIGHT = 2.39849037E+05

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



OPTIMAL STRUCTURES OF TPS FOR PATCH = 6
(WITH AVERAGE THICKNESS)

HRSI COAT	thin skin	0.05000 in.	228.7 F
AB312 Fabric	slab	0.08000 in.	228.7 F
Q-Felt(3.5 PCF)	thin skin	1.00000 in.	176.3 F
AB312 Fabric	slab	0.05000 in.	176.3 F
RTV-560	thin skin	0.05000 in.	156.9 F
ALUMINUM 2024-T4	slab	0.15000 in.	156.9 F

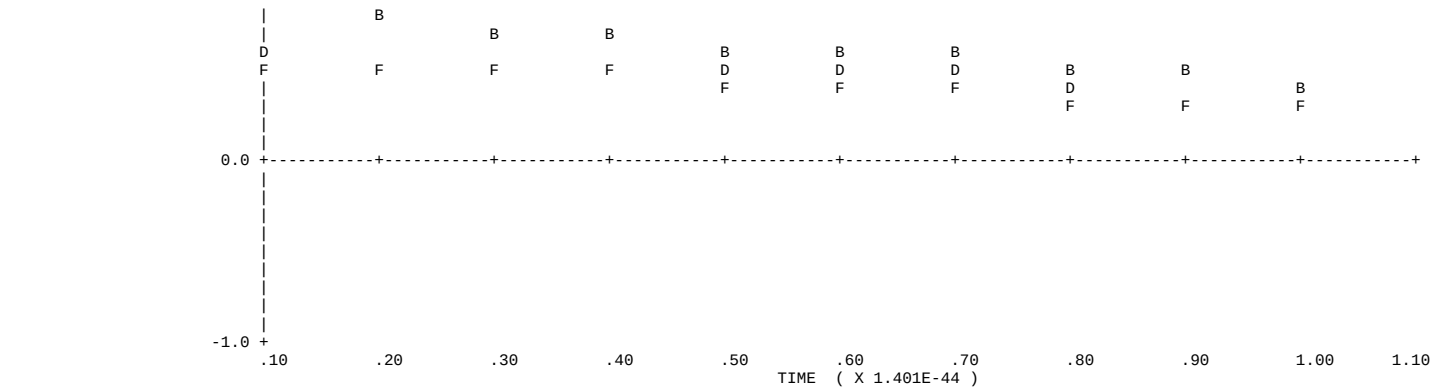
THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH = 6

PANEL	LAYER01		LAYER02		LAYER03		LAYER04		LAYER05		LAYER06	
30	0.05000	228.68	0.08000	228.68	1.00000	202.51	0.05000	176.35	0.05000	166.63	0.15000	156.91
31	0.05000	226.92	0.08000	226.92	1.00000	200.91	0.05000	174.90	0.05000	165.24	0.15000	155.57
32	0.05000	225.17	0.08000	225.17	1.00000	199.32	0.05000	173.47	0.05000	163.86	0.15000	154.25
33	0.05000	223.56	0.08000	223.56	1.00000	197.86	0.05000	172.15	0.05000	162.59	0.15000	153.04
34	0.05000	222.14	0.08000	222.14	1.00000	196.56	0.05000	170.98	0.05000	161.47	0.15000	151.96
35	0.05000	220.46	0.08000	220.46	1.00000	195.03	0.05000	169.60	0.05000	160.14	0.15000	150.69
36	0.05000	218.53	0.08000	218.53	1.00000	193.28	0.05000	168.03	0.05000	158.63	0.15000	149.23
37	0.05000	216.79	0.08000	216.79	1.00000	191.70	0.05000	166.60	0.05000	157.26	0.15000	147.92
38	0.05000	215.20	0.08000	215.20	1.00000	190.25	0.05000	165.29	0.05000	156.00	0.15000	146.71
39	0.05000	213.63	0.08000	213.63	1.00000	188.82	0.05000	164.01	0.05000	154.77	0.15000	145.52
40	0.05000	211.75	0.08000	211.75	1.00000	187.11	0.05000	162.47	0.05000	153.29	0.15000	144.10
70	0.05000	226.67	0.08000	226.67	1.00000	200.51	0.05000	174.36	0.05000	164.62	0.15000	154.89
71	0.05000	225.12	0.08000	225.12	1.00000	199.11	0.05000	173.11	0.05000	163.42	0.15000	153.72
72	0.05000	223.58	0.08000	223.58	1.00000	197.73	0.05000	171.88	0.05000	162.22	0.15000	152.56
73	0.05000	222.16	0.08000	222.16	1.00000	196.45	0.05000	170.74	0.05000	161.12	0.15000	151.49
74	0.05000	220.90	0.08000	220.90	1.00000	195.32	0.05000	169.73	0.05000	160.14	0.15000	150.54
75	0.05000	219.42	0.08000	219.42	1.00000	193.98	0.05000	168.54	0.05000	158.98	0.15000	149.42
76	0.05000	217.73	0.08000	217.73	1.00000	192.45	0.05000	167.18	0.05000	157.66	0.15000	148.14
77	0.05000	216.19	0.08000	216.19	1.00000	191.07	0.05000	165.95	0.05000	156.47	0.15000	146.98
78	0.05000	214.79	0.08000	214.79	1.00000	189.81	0.05000	164.83	0.05000	155.38	0.15000	145.92
79	0.05000	213.43	0.08000	213.43	1.00000	188.58	0.05000	163.73	0.05000	154.31	0.15000	144.89
80	0.05000	211.80	0.08000	211.80	1.00000	187.11	0.05000	162.43	0.05000	153.05	0.15000	143.66
110	0.05000	224.81	0.08000	224.81	1.00000	198.66	0.05000	172.52	0.05000	162.77	0.15000	153.03
111	0.05000	223.45	0.08000	223.45	1.00000	197.46	0.05000	171.46	0.05000	161.73	0.15000	152.01
112	0.05000	222.11	0.08000	222.11	1.00000	196.26	0.05000	170.41	0.05000	160.70	0.15000	150.99
113	0.05000	220.87	0.08000	220.87	1.00000	195.16	0.05000	169.44	0.05000	159.75	0.15000	150.06
114	0.05000	219.77	0.08000	219.77	1.00000	194.17	0.05000	168.58	0.05000	158.91	0.15000	149.23
115	0.05000	218.47	0.08000	218.47	1.00000	193.02	0.05000	167.57	0.05000	157.91	0.15000	148.26
116	0.05000	216.99	0.08000	216.99	1.00000	191.70	0.05000	166.41	0.05000	156.78	0.15000	147.14
117	0.05000	215.64	0.08000	215.64	1.00000	190.50	0.05000	165.37	0.05000	155.75	0.15000	146.13
118	0.05000	214.42	0.08000	214.42	1.00000	189.42	0.05000	164.41	0.05000	154.81	0.15000	145.20
119	0.05000	213.24	0.08000	213.24	1.00000	188.37	0.05000	163.49	0.05000	153.90	0.15000	144.31
120	0.05000	211.84	0.08000	211.84	1.00000	187.12	0.05000	162.39	0.05000	152.82	0.15000	143.25
150	0.05000	222.89	0.08000	222.89	1.00000	196.76	0.05000	170.62	0.05000	160.87	0.15000	151.11
151	0.05000	221.74	0.08000	221.74	1.00000	195.75	0.05000	169.76	0.05000	160.00	0.15000	150.25
152	0.05000	220.59	0.08000	220.59	1.00000	194.74	0.05000	168.90	0.05000	159.14	0.15000	149.39
153	0.05000	219.54	0.08000	219.54	1.00000	193.82	0.05000	168.11	0.05000	158.35	0.15000	148.59
154	0.05000	218.60	0.08000	218.60	1.00000	193.00	0.05000	167.40	0.05000	157.65	0.15000	147.89
155	0.05000	217.50	0.08000	217.50	1.00000	192.04	0.05000	166.57	0.05000	156.82	0.15000	147.06
156	0.05000	216.23	0.08000	216.23	1.00000	190.93	0.05000	165.63	0.05000	155.87	0.15000	146.11
157	0.05000	215.09	0.08000	215.09	1.00000	189.93	0.05000	164.77	0.05000	155.01	0.15000	145.25
158	0.05000	214.06	0.08000	214.06	1.00000	189.02	0.05000	163.99	0.05000	154.23	0.15000	144.47
159	0.05000	213.06	0.08000	213.06	1.00000	188.15	0.05000	163.24	0.05000	153.48	0.15000	143.72
160	0.05000	211.88	0.08000	211.88	1.00000	187.12	0.05000	162.36	0.05000	152.59	0.15000	142.83
190	0.05000	220.75	0.08000	220.75	1.00000	194.62	0.05000	168.49	0.05000	158.73	0.15000	148.96
191	0.05000	219.83	0.08000	219.83	1.00000	193.84	0.05000	167.85	0.05000	158.06	0.15000	148.28
192	0.05000	218.91	0.08000	218.91	1.00000	193.06	0.05000	167.21	0.05000	157.40	0.15000	147.59
193	0.05000	218.06	0.08000	218.06	1.00000	192.33	0.05000	166.61	0.05000	156.78	0.15000	146.95
194	0.05000	217.31	0.08000	217.31	1.00000	191.70	0.05000	166.09	0.05000	156.24	0.15000	146.39
195	0.05000	216.42	0.08000	216.42	1.00000	190.95	0.05000	165.47	0.05000	155.60	0.15000	145.73
196	0.05000	215.40	0.08000	215.40	1.00000	190.08	0.05000	164.75	0.05000	154.86	0.15000	144.97
197	0.05000	214.48	0.08000	214.48	1.00000	189.29	0.05000	164.11	0.05000	154.19	0.15000	144.28
198	0.05000	213.65	0.08000	213.65	1.00000	188.59	0.05000	163.53	0.05000	153.59	0.15000	143.65
199	0.05000	212.87	0.08000	212.87	1.00000	187.92	0.05000	162.98	0.05000	153.02	0.15000	143.06
200	0.05000	211.93	0.08000	211.93	1.00000	187.12	0.05000	162.32	0.05000	152.34	0.15000	142.36

OPTIMIZATION SYSTEM FOR TPSSYM = 7

TOTAL NUMBER OF DESIGN VARIABLES = 30
TOTAL NUMBER OF CONSTRAINS = 1634
TOTAL NUMBER OF TEMP. CONSTRAINS = 924
TOTAL NUMBER OF TEMP. PRINTOUTS = 11

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
X 0.4161E+03
1.0 B
|



MAXIMUM TEMPERATURE OF EVERY LAYER

LAYER:	1	2	3	4	5	6
Tmax:	2300.33	2020.33	1800.33	2020.33	550.33	300.33
Optv:	416.10	416.10	259.06	259.06	207.66	207.66

VALUES OF DESIGN VARIABLES :

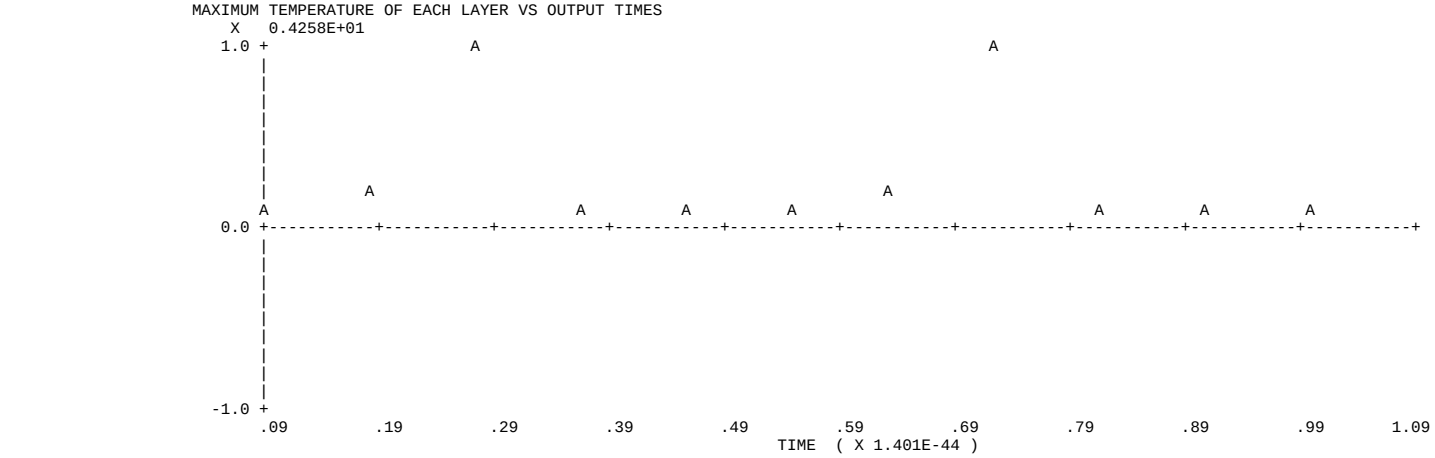
LAYER	DEV01	DEV02	DEV03	DEV04	DEV05	DEV06
1	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000
2	0.08000	0.08000	0.08000	0.08000	0.08000	0.08000
3	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
4	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000
5	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000

THE ORIGINAL OBJECTIVE FUNCTION = 269.2112732

THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.5028006

THE TOTAL OPTIMAL WEIGHT = 4.16978895E+05

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



OPTIMAL STRUCTURES OF TPS FOR PATCH = 7
(WITH AVERAGE THICKNESS)

HRSI COAT	thin skin	0.05000 in.	416.1	F
AB312 Fabric	slab	0.08000 in.	416.1	F
Q-Felt(3.5 PCF)	thin skin	1.00000 in.	259.1	F
AB312 Fabric	slab	0.05000 in.	259.1	F
RTV-560	thin skin	0.05000 in.	207.7	F
ALUMINUM 2024-T4	slab	0.15000 in.	207.7	F

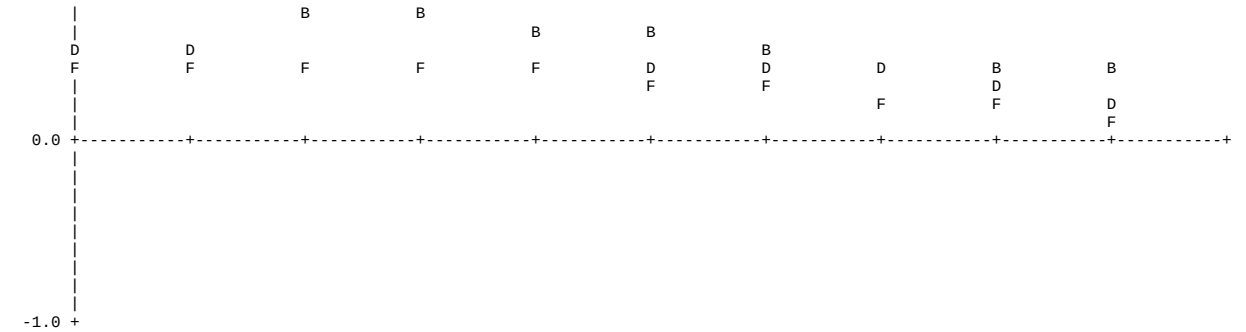
THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH = 7

PANEL	LAYER01		LAYER02		LAYER03		LAYER04		LAYER05		LAYER06	
230	0.05000	237.42	0.08000	237.42	1.00000	210.52	0.05000	183.62	0.05000	175.36	0.15000	167.09
231	0.05000	230.26	0.08000	230.26	1.00000	205.51	0.05000	180.76	0.05000	172.19	0.15000	163.61
232	0.05000	225.63	0.08000	225.63	1.00000	202.21	0.05000	178.78	0.05000	169.94	0.15000	161.10
233	0.05000	225.49	0.08000	223.72	1.00000	200.76	0.05000	177.79	0.05000	168.73	0.15000	159.66
234	0.05000	225.49	0.08000	223.58	1.00000	200.51	0.05000	177.43	0.05000	168.21	0.15000	158.98
235	0.05000	225.49	0.08000	225.49	1.00000	201.60	0.05000	177.72	0.05000	168.35	0.15000	158.98
236	0.05000	230.63	0.08000	230.63	1.00000	204.86	0.05000	179.09	0.05000	169.58	0.15000	160.08
237	0.05000	237.89	0.08000	237.89	1.00000	209.56	0.05000	181.23	0.05000	171.64	0.15000	162.04
238	0.05000	246.23	0.08000	246.23	1.00000	215.00	0.05000	183.78	0.05000	174.16	0.15000	164.53
239	0.05000	256.10	0.08000	256.10	1.00000	221.48	0.05000	186.86	0.05000	177.21	0.15000	167.55
240	0.05000	270.08	0.08000	270.08	1.00000	230.71	0.05000	191.34	0.05000	181.75	0.15000	172.15
270	0.05000	240.40	0.08000	240.40	1.00000	211.73	0.05000	183.07	0.05000	174.63	0.15000	166.19
271	0.05000	241.54	0.08000	241.54	1.00000	213.08	0.05000	184.62	0.05000	175.27	0.15000	165.92
272	0.05000	243.07	0.08000	243.07	1.00000	214.46	0.05000	185.86	0.05000	175.75	0.15000	165.64
273	0.05000	245.14	0.08000	245.14	1.00000	216.01	0.05000	186.88	0.05000	176.18	0.15000	165.49
274	0.05000	247.03	0.08000	247.03	1.00000	217.26	0.05000	187.50	0.05000	176.40	0.15000	165.30
275	0.05000	249.70	0.08000	249.70	1.00000	218.88	0.05000	188.05	0.05000	176.60	0.15000	165.15
276	0.05000	252.85	0.08000	252.85	1.00000	220.54	0.05000	188.24	0.05000	176.59	0.15000	164.95
277	0.05000	256.67	0.08000	256.67	1.00000	222.53	0.05000	188.39	0.05000	176.69	0.15000	164.99
278	0.05000	260.49	0.08000	260.49	1.00000	224.44	0.05000	188.40	0.05000	176.78	0.15000	165.16
279	0.05000	265.00	0.08000	265.00	1.00000	226.73	0.05000	188.47	0.05000	176.99	0.15000	165.50
280	0.05000	271.17	0.08000	271.17	1.00000	229.88	0.05000	188.58	0.05000	177.42	0.15000	166.26
310	0.05000	244.31	0.08000	244.31	1.00000	213.33	0.05000	182.35	0.05000	173.67	0.15000	164.99
311	0.05000	256.52	0.08000	256.52	1.00000	223.13	0.05000	189.75	0.05000	179.36	0.15000	168.97
312	0.05000	266.22	0.08000	266.22	1.00000	230.73	0.05000	195.24	0.05000	183.45	0.15000	171.66
313	0.05000	273.53	0.08000	273.53	1.00000	236.23	0.05000	198.92	0.05000	186.07	0.15000	173.21
314	0.05000	278.46	0.08000	278.46	1.00000	239.73	0.05000	201.00	0.05000	187.39	0.15000	173.78
315	0.05000	282.81	0.08000	282.81	1.00000	242.49	0.05000	202.18	0.05000	187.89	0.15000	173.59
316	0.05000	283.67	0.08000	283.67	1.00000	242.29	0.05000	200.92	0.05000	186.32	0.15000	171.71
317	0.05000	283.14	0.08000	283.14	1.00000	240.81	0.05000	198.49	0.05000	183.82	0.15000	169.15
318	0.05000	281.14	0.08000	281.14	1.00000	238.11	0.05000	195.09	0.05000	180.58	0.15000	166.08
319	0.05000	278.20	0.08000	278.20	1.00000	234.54	0.05000	190.88	0.05000	176.69	0.15000	162.49
320	0.05000	272.88	0.08000	272.88	1.00000	228.66	0.05000	184.45	0.05000	170.91	0.15000	157.38
350	0.05000	249.32	0.08000	249.32	1.00000	215.38	0.05000	181.43	0.05000	172.45	0.15000	163.47
351	0.05000	275.63	0.08000	275.63	1.00000	235.95	0.05000	196.28	0.05000	184.57	0.15000	172.87
352	0.05000	295.79	0.08000	295.79	1.00000	251.51	0.05000	207.22	0.05000	193.29	0.15000	179.35
353	0.05000	309.85	0.08000	309.85	1.00000	262.09	0.05000	214.33	0.05000	198.71	0.15000	183.09
354	0.05000	318.89	0.08000	318.89	1.00000	268.63	0.05000	218.36	0.05000	201.52	0.15000	184.69
355	0.05000	325.81	0.08000	325.81	1.00000	273.16	0.05000	220.52	0.05000	202.55	0.15000	184.57
356	0.05000	324.11	0.08000	324.11	1.00000	270.84	0.05000	217.58	0.05000	199.09	0.15000	180.60
357	0.05000	318.28	0.08000	318.28	1.00000	265.09	0.05000	211.90	0.05000	193.30	0.15000	174.70
358	0.05000	308.92	0.08000	308.92	1.00000	256.51	0.05000	204.10	0.05000	185.72	0.15000	167.34
359	0.05000	296.16	0.08000	296.16	1.00000	245.16	0.05000	194.16	0.05000	176.28	0.15000	158.41
360	0.05000	275.25	0.08000	275.25	1.00000	227.00	0.05000	178.76	0.05000	161.96	0.15000	145.17
390	0.05000	254.11	0.08000	254.11	1.00000	217.33	0.05000	180.55	0.05000	171.28	0.15000	162.01
391	0.05000	293.88	0.08000	293.88	1.00000	248.20	0.05000	202.51	0.05000	189.55	0.15000	176.58
392	0.05000	324.04	0.08000	324.04	1.00000	271.35	0.05000	218.67	0.05000	202.68	0.15000	186.70
393	0.05000	344.58	0.08000	344.58	1.00000	286.82	0.05000	229.05	0.05000	210.80	0.15000	192.54
394	0.05000	357.63	0.08000	357.63	1.00000	296.31	0.05000	234.99	0.05000	215.06	0.15000	195.14
395	0.05000	367.13	0.08000	367.13	1.00000	302.64	0.05000	238.16	0.05000	216.65	0.15000	195.13
396	0.05000	363.11	0.08000	363.11	1.00000	298.38	0.05000	233.65	0.05000	211.42	0.15000	189.19
397	0.05000	352.28	0.08000	352.28	1.00000	288.59	0.05000	224.89	0.05000	202.48	0.15000	180.08
398	0.05000	335.89	0.08000	335.89	1.00000	274.37	0.05000	212.85	0.05000	190.71	0.15000	168.58
399	0.05000	313.59	0.08000	313.59	1.00000	255.46	0.05000	197.33	0.05000	175.88	0.15000	154.44
400	0.05000	277.53	0.08000	277.53	1.00000	225.36	0.05000	173.19	0.05000	153.22	0.15000	133.24
430	0.05000	257.57	0.08000	257.57	1.00000	218.74	0.05000	179.91	0.05000	170.43	0.15000	160.96
431	0.05000	307.04	0.08000	307.04	1.00000	257.02	0.05000	207.00	0.05000	193.13	0.15000	179.25
432	0.05000	344.40	0.08000	344.40	1.00000	285.66	0.05000	226.91	0.05000	209.45	0.15000	191.99
433	0.05000	369.60	0.08000	369.60	1.00000	304.63	0.05000	239.66	0.05000	219.51	0.15000	199.35
434	0.05000	385.48	0.08000	385.48	1.00000	316.21	0.05000	246.95	0.05000	224.80	0.15000	202.66
435	0.05000	396.73	0.08000	396.73	1.00000	323.76	0.05000	250.80	0.05000	226.75	0.15000	202.71
436	0.05000	390.94	0.08000	390.94	1.00000	318.03	0.05000	245.12	0.05000	220.23	0.15000	195.33
437	0.05000	376.41	0.08000	376.41	1.00000	305.26	0.05000	234.11	0.05000	209.01	0.15000	183.91
438	0.05000	354.94	0.08000	354.94	1.00000	287.00	0.05000	219.05	0.05000	194.27	0.15000	169.49
439	0.05000	325.92	0.08000	325.92	1.00000	262.77	0.05000	199.62	0.05000	175.66	0.15000	151.70
440	0.05000	279.22	0.08000	279.22	1.00000	224.30	0.05000	169.37	0.05000	147.18	0.15000	124.99
470	0.05000	259.89	0.08000	259.89	1.00000	219.69	0.05000	179.48	0.05000	169.87	0.15000	160.25
471	0.05000	315.84	0.08000	315.84	1.00000	262.92	0.05000	210.00	0.05000	195.52	0.15000	181.04
472	0.05000	358.01	0.08000	358.01	1.00000	295.21	0.05000	232.42	0.05000	213.97	0.15000	195.52
473	0.05000	386.28	0.08000	386.28	1.00000	316.51	0.05000	246.73	0.05000	225.31	0.15000	203.88
474	0.05000	403.92	0.08000	403.92	1.00000	329.39	0.05000	254.86	0.05000	231.25	0.15000	207.63
475	0.05000	416.10	0.08000	416.10	1.00000	337.58	0.05000	259.06	0.05000	233.36	0.15000	207.66
476	0.05000	408.91	0.08000	408.91	1.00000	330.72	0.05000	252.53	0.05000	225.92	0.15000	199.30
477	0.05000	391.72	0.08000	391.72	1.00000	315.84	0.05000	239.96	0.05000	213.15	0.15000	186.34
478	0.05000	366.68	0.08000	366.68	1.00000	294.77	0.05000	222.85	0.05000	196.43	0.15000	170.01
479	0.05000	333.12	0.08000	333.12	1.00000	266.99	0.05000	200.86	0.05000	175.40	0.15000	149.95
480	0.05000	279.88	0.08000	279.88	1.00000	223.42	0.05000	166.97	0.05000	143.50	0.15000	120.03

OPTIMIZATION SYSTEM FOR TPSSYM = 8

TOTAL NUMBER OF DESIGN VARIABLES = 45
TOTAL NUMBER OF CONSTRAINS = 2124
TOTAL NUMBER OF TEMP. CONSTRAINS = 1584
TOTAL NUMBER OF TEMP. PRINTOUTS = 11

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
X 0.7887E+03
1.0 B
|
|
B



MAXIMUM TEMPERATURE OF EVERY LAYER

LAYER:	1	2	3	4	5	6
Tmax:	2300.33	2020.33	1800.33	2020.33	550.33	300.33
Optv:	788.72	788.72	367.77	367.77	292.90	292.90

VALUES OF DESIGN VARIABLES :

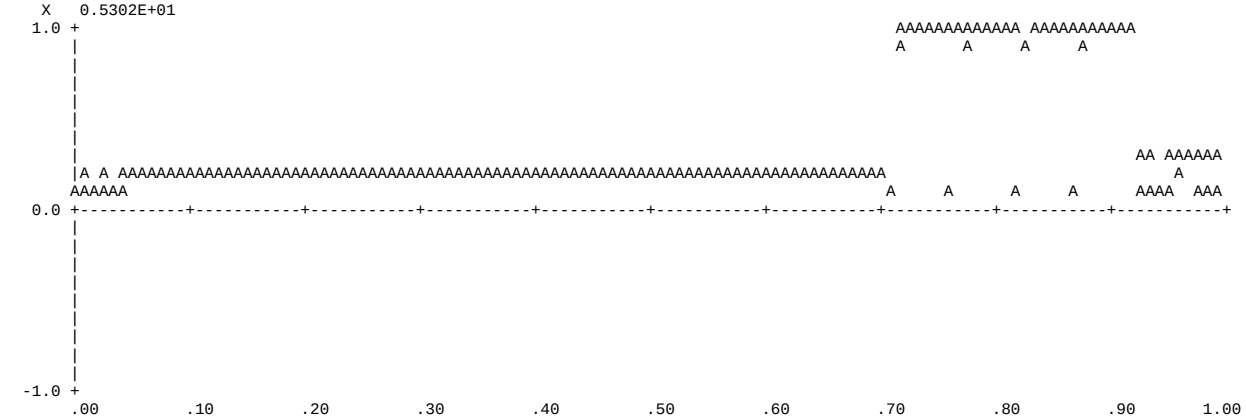
LAYER	DEV01	DEV02	DEV03	DEV04	DEV05	DEV06	DEV07	DEV08	DEV09
1	0.12585	0.10902	0.12331	0.12784	0.07423	0.07285	0.05109	0.11797	0.05882
2	0.08000	0.08811	0.08254	0.10758	0.12711	0.12225	0.09889	0.17046	0.09412
3	1.00000	1.02411	1.03175	1.01521	1.06436	1.09939	1.02171	1.09392	1.17647
4	0.05000	0.05121	0.05159	0.05076	0.05322	0.05497	0.05109	0.08502	0.05882
5	0.05000	0.05121	0.05159	0.05076	0.08572	0.05497	0.05109	0.09499	0.05882

THE ORIGINAL OBJECTIVE FUNCTION = 220.3228912

THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.7153327

THE TOTAL OPTIMAL WEIGHT = 5.66354956E+05

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



OPTIMAL STRUCTURES OF TPS FOR PATCH = 8
(WITH AVERAGE THICKNESS)

HRSI COAT	thin skin	0.09389 in.	788.7 F
AB312 Fabric	slab	0.11561 in.	788.7 F
Q-Felt(3.5 PCF)	thin skin	1.06690 in.	367.8 F
AB312 Fabric	slab	0.05819 in.	367.8 F
RTV-560	thin skin	0.06586 in.	292.9 F
ALUMINUM 2024-T4	slab	0.15000 in.	292.9 F

THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH = 8

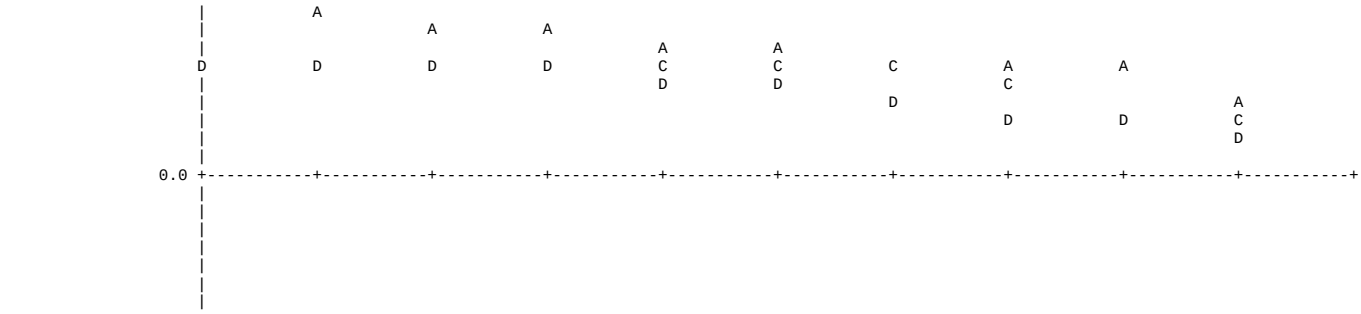
PANEL	LAYER01	LAYER02	LAYER03	LAYER04	LAYER05	LAYER06

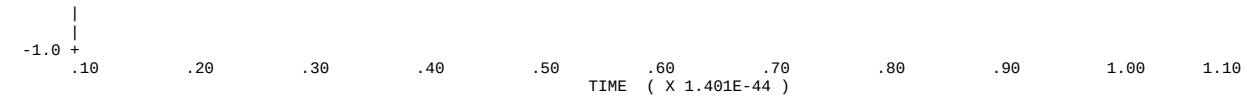
510	0.12585	212.72	0.08000	212.72	1.00000	187.54	0.05000	162.35	0.05000	153.56	0.15000	144.78
511	0.11652	222.83	0.08434	222.83	1.01013	193.87	0.05051	164.91	0.05051	154.35	0.15000	143.78
512	0.11093	225.82	0.08705	225.82	1.01829	194.88	0.05091	163.93	0.05091	152.36	0.15000	140.78
513	0.10902	222.33	0.08811	222.33	1.02411	191.12	0.05121	159.90	0.05121	148.07	0.15000	136.23
514	0.10987	213.96	0.08795	213.96	1.02799	183.81	0.05139	153.67	0.05144	142.18	0.15000	130.69
515	0.11410	198.07	0.08635	198.07	1.03086	170.69	0.05153	143.31	0.05159	132.87	0.15000	122.43
516	0.12331	172.46	0.08254	172.46	1.03175	150.11	0.05159	127.75	0.05159	119.32	0.15000	110.89
550	0.13178	186.22	0.08720	186.22	1.00328	168.12	0.05015	150.02	0.05024	142.49	0.15000	134.95
551	0.11509	202.25	0.08932	202.25	1.01407	179.14	0.05000	156.03	0.05400	147.34	0.15000	138.66
552	0.10560	208.01	0.09129	208.01	1.02286	182.28	0.05000	156.54	0.05568	147.10	0.15000	137.67
553	0.10116	204.82	0.09265	204.82	1.02967	178.70	0.05012	152.58	0.05648	143.04	0.15000	133.50
554	0.10076	196.12	0.09311	196.12	1.03441	171.01	0.05045	145.89	0.05637	136.65	0.15000	127.41
555	0.10498	179.63	0.09254	179.63	1.03802	157.13	0.05106	134.62	0.05500	126.12	0.15000	117.62
556	0.11586	172.46	0.09010	154.60	1.03912	136.53	0.05195	119.32	0.05197	111.18	0.15000	110.89
590	0.13599	172.46	0.09514	167.99	1.00726	154.64	0.05030	141.28	0.05066	134.73	0.15000	128.18
591	0.11293	183.32	0.09654	183.32	1.01962	165.46	0.05000	147.60	0.05878	140.94	0.15000	134.28
592	0.09829	189.48	0.09833	189.48	1.02999	169.05	0.05000	148.63	0.06286	141.80	0.15000	134.97
593	0.09034	186.85	0.10014	186.85	1.03848	165.85	0.05000	144.84	0.06447	138.10	0.15000	131.36
594	0.08806	177.91	0.10146	177.91	1.04484	157.76	0.05000	137.61	0.06382	131.10	0.15000	124.60
595	0.09210	172.46	0.10208	160.53	1.04989	142.83	0.05082	125.13	0.05996	118.92	0.15000	112.71
596	0.10437	172.46	0.10110	150.11	1.05172	127.75	0.05259	119.32	0.05259	110.89	0.15000	110.89
630	0.13583	173.13	0.10280	173.13	1.01161	157.98	0.05053	142.83	0.05104	136.33	0.15000	129.84
631	0.11012	182.43	0.10600	182.43	1.02639	164.40	0.05000	146.38	0.06429	140.77	0.15000	135.17
632	0.09085	187.55	0.10898	187.55	1.03963	167.28	0.05000	147.02	0.07202	141.93	0.15000	136.84
633	0.07886	186.28	0.11189	186.28	1.05124	164.97	0.05000	143.66	0.07518	138.86	0.15000	134.06
634	0.07413	178.39	0.11403	178.39	1.06061	157.44	0.05019	136.49	0.07371	131.76	0.15000	127.03
635	0.07732	172.46	0.11488	160.20	1.06841	141.68	0.05170	123.17	0.06597	118.23	0.15000	113.28
636	0.08869	172.46	0.11396	150.11	1.07197	127.75	0.05360	119.32	0.05360	110.89	0.15000	110.89
670	0.12784	220.08	0.10758	220.08	1.01521	191.56	0.05076	163.04	0.05076	154.82	0.15000	146.61
671	0.10686	223.89	0.11597	223.89	1.03260	193.23	0.05163	162.57	0.06865	155.34	0.15000	148.11
672	0.08768	232.06	0.12248	232.06	1.04956	197.86	0.05233	163.66	0.08053	156.88	0.15000	150.10
673	0.07432	236.71	0.12720	236.71	1.06539	199.63	0.05327	162.55	0.08577	155.76	0.15000	148.97
674	0.06735	232.84	0.12901	232.84	1.07927	195.12	0.05412	157.40	0.08358	150.39	0.15000	143.38
675	0.06687	215.82	0.12700	215.82	1.09190	180.87	0.05471	145.92	0.07198	138.58	0.15000	131.23
676	0.07285	189.80	0.12225	189.80	1.09939	160.32	0.05497	130.85	0.05497	123.22	0.15000	115.58
710	0.11022	307.66	0.10930	307.66	1.01917	254.43	0.05117	201.20	0.05201	189.59	0.15000	177.98
711	0.10088	313.25	0.12457	313.25	1.03828	255.92	0.05537	198.58	0.07200	186.65	0.15000	174.71
712	0.08896	328.53	0.13612	328.53	1.05882	264.62	0.05871	200.71	0.08648	187.99	0.15000	175.27
713	0.07916	338.97	0.14227	338.97	1.07915	270.27	0.06087	201.56	0.09245	188.04	0.15000	174.51
714	0.07181	339.25	0.14136	339.25	1.09805	269.36	0.06121	199.47	0.08854	185.49	0.15000	171.51
715	0.06556	321.79	0.13118	321.79	1.11654	256.66	0.05891	191.52	0.07217	177.89	0.15000	164.26
716	0.06318	300.56	0.12085	300.56	1.12576	241.71	0.05629	182.86	0.05629	169.92	0.15000	156.97
750	0.08924	415.88	0.10749	415.88	1.02121	332.33	0.05153	248.78	0.05224	232.78	0.15000	216.77
751	0.09485	425.27	0.12969	425.27	1.04091	334.89	0.05959	244.51	0.07260	226.24	0.15000	207.97
752	0.09519	451.93	0.14709	451.93	1.06382	350.42	0.06650	248.91	0.08841	227.77	0.15000	206.63
753	0.09263	470.95	0.15517	470.95	1.08800	361.89	0.07039	252.82	0.09529	229.64	0.15000	206.45
754	0.08501	475.18	0.15045	475.18	1.11202	364.88	0.06972	254.58	0.09098	230.97	0.15000	207.36
755	0.06974	458.94	0.12980	458.94	1.13658	355.81	0.06322	252.68	0.07289	230.86	0.15000	209.04
756	0.05874	457.24	0.11133	457.24	1.15106	357.32	0.05755	257.39	0.05755	236.63	0.15000	215.86
790	0.06869	517.61	0.10342	517.61	1.02178	405.81	0.05146	294.00	0.05173	273.93	0.15000	253.85
791	0.08792	532.25	0.13127	532.25	1.04120	410.69	0.06293	289.13	0.07143	264.86	0.15000	240.58
792	0.10132	567.38	0.15414	567.38	1.06524	430.98	0.07327	294.59	0.08774	265.41	0.15000	236.23
793	0.10739	593.14	0.16468	593.14	1.09237	446.81	0.07909	300.49	0.09559	267.99	0.15000	235.49
794	0.10034	599.42	0.15677	599.42	1.12063	452.25	0.07753	305.07	0.09172	272.30	0.15000	239.53
795	0.07807	586.99	0.12820	586.99	1.14942	448.22	0.06774	309.46	0.07456	279.69	0.15000	249.92
796	0.05825	570.56	0.10223	570.56	1.16584	441.07	0.05829	311.58	0.05829	285.06	0.15000	258.55
830	0.05109	599.57	0.09889	599.57	1.02171	465.18	0.05109	330.78	0.05109	307.54	0.15000	284.29
831	0.08100	614.97	0.13081	614.97	1.04061	469.55	0.06500	324.13	0.06993	295.36	0.15000	266.59
832	0.10484	650.10	0.15776	650.10	1.06504	488.88	0.07774	327.65	0.08639	292.77	0.15000	257.88
833	0.11797	677.28	0.17046	677.28	1.09392	505.31	0.08502	333.34	0.09499	294.33	0.15000	255.31
834	0.11216	677.28	0.16094	677.28	1.12463	508.46	0.08303	339.22	0.09184	300.04	0.15000	260.86
835	0.08681	675.63	0.12863	675.63	1.15550	508.46	0.07169	347.87	0.07627	312.23	0.15000	276.59
836	0.05882	661.68	0.09412	661.68	1.17647	508.46	0.05882	355.24	0.05882	324.07	0.15000	292.90

OPTIMIZATION SYSTEM FOR TPSSYM = 9

TOTAL NUMBER OF DESIGN VARIABLES = 36
TOTAL NUMBER OF CONSTRAINS = 976
TOTAL NUMBER OF TEMP. CONSTRAINS = 880
TOTAL NUMBER OF TEMP. PRINTOUTS = 11

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES





MAXIMUM TEMPERATURE OF EVERY LAYER

LAYER:	1	2	3	4
Tmax:	2300.33	350.33	800.33	300.33
Optv:	506.20	325.86	325.07	300.12

VALUES OF DESIGN VARIABLES :

LAYER	DEV01	DEV02	DEV03	DEV04	DEV05	DEV06	DEV07	DEV08	DEV09	DEV10	DEV11	DEV12
1	0.08000	0.08000	0.08000	0.08000	0.24428	0.08000	0.08000	0.19839	0.08000	0.08000	0.08000	0.08000
2	0.30000	0.30000	0.30000	0.30000	0.30401	0.30000	0.30000	0.30305	0.30000	0.30000	0.30000	0.30000
3	0.40000	0.40000	0.40000	0.40000	0.40535	0.40000	0.40000	0.40406	0.40000	0.40000	0.40000	0.40000

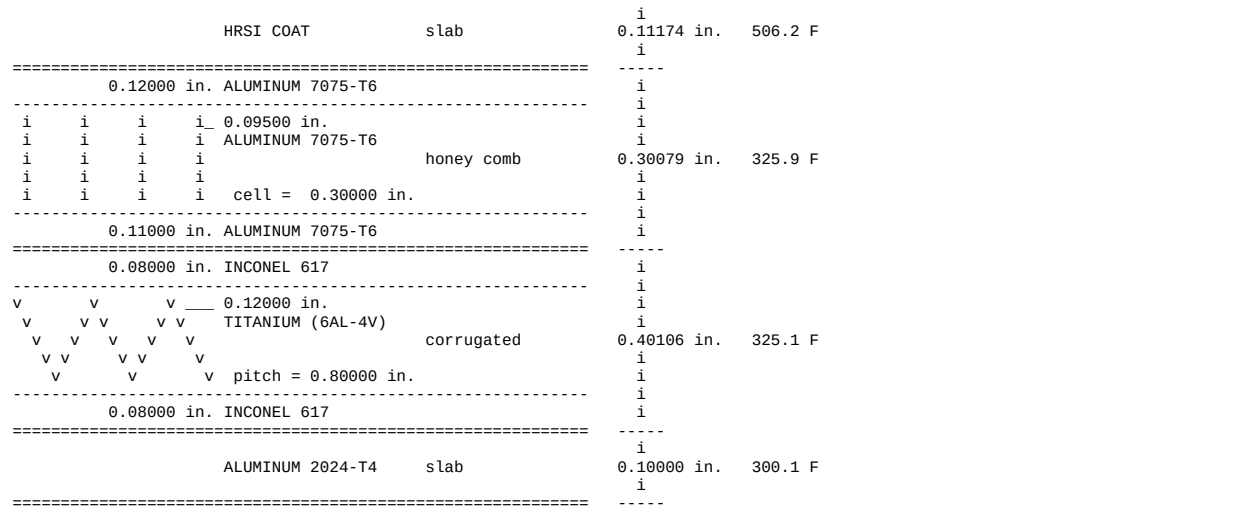
THE ORIGINAL OBJECTIVE FUNCTION = 1357.7404785

THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.4146046

THE TOTAL OPTIMAL WEIGHT = 2.34472696E+05

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES

OPTIMAL STRUCTURES OF TPS FOR PATCH = 9
(WITH AVERAGE THICKNESS)



THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH = 9

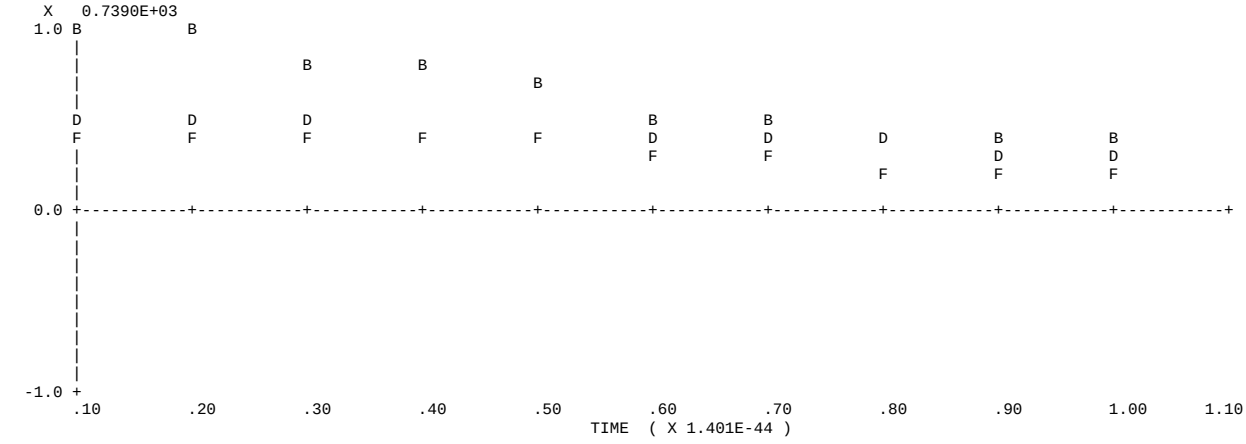
PANEL	LAYER01		LAYER02		LAYER03		LAYER04	
870	0.08000	405.67	0.30000	350.33	0.40000	303.14	0.10000	289.40
871	0.08000	388.41	0.30000	343.17	0.40000	302.95	0.10000	289.14
872	0.08000	365.17	0.30000	330.91	0.40000	298.44	0.10000	284.75
873	0.08000	336.87	0.30000	312.26	0.40000	286.91	0.10000	273.71
874	0.08509	312.79	0.30012	288.30	0.40016	268.19	0.10000	255.73
875	0.08401	277.95	0.30009	258.10	0.40013	241.77	0.10000	230.63
876	0.08000	253.70	0.30000	237.16	0.40000	220.13	0.10000	210.15

910	0.08000	365.19	0.30000	343.39	0.40000	320.86	0.10000	300.33
911	0.14962	428.86	0.30169	350.33	0.40226	325.47	0.10000	300.33
912	0.21294	491.88	0.30324	350.33	0.40432	325.47	0.10000	300.33
913	0.24428	506.20	0.30401	350.33	0.40535	324.19	0.10000	300.33
914	0.22484	463.17	0.30354	325.25	0.40472	301.10	0.10000	280.54
915	0.15476	363.28	0.30183	284.67	0.40244	264.33	0.10000	249.76
916	0.08000	263.89	0.30000	248.06	0.40000	231.76	0.10000	222.71
950	0.08000	470.10	0.30000	350.33	0.40000	299.29	0.10000	283.94
951	0.11485	422.38	0.30093	343.98	0.40124	304.10	0.10000	286.01
952	0.16004	389.77	0.30210	348.67	0.40279	321.02	0.10000	297.83
953	0.19839	393.46	0.30304	350.32	0.40405	325.46	0.10000	300.33
954	0.18453	381.63	0.30268	341.83	0.40358	309.72	0.10000	287.61
955	0.13386	379.22	0.30138	328.87	0.40184	279.76	0.10000	264.53
956	0.08000	384.38	0.30000	318.41	0.40000	252.03	0.10000	243.53
990	0.08000	269.03	0.30000	257.08	0.40000	244.84	0.10000	236.88
991	0.08000	287.34	0.30000	270.65	0.40000	253.47	0.10000	244.50
992	0.08000	302.70	0.30000	281.94	0.40000	260.51	0.10000	250.63
993	0.08000	308.72	0.30000	286.15	0.40000	262.82	0.10000	252.41
994	0.08000	300.90	0.30000	279.93	0.40000	258.24	0.10000	247.93
995	0.08000	279.09	0.30000	263.18	0.40000	246.73	0.10000	237.17
996	0.08000	256.77	0.30000	246.15	0.40000	235.20	0.10000	226.50

OPTIMIZATION SYSTEM FOR TPSSYM = 10

TOTAL NUMBER OF DESIGN VARIABLES = 45
TOTAL NUMBER OF CONSTRAINS = 1344
TOTAL NUMBER OF TEMP. CONSTRAINS = 594
TOTAL NUMBER OF TEMP. PRINTOUTS = 11

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



MAXIMUM TEMPERATURE OF EVERY LAYER

LAYER:	1	2	3	4	5	6
Tmax:	2300.33	2020.33	1800.33	2020.33	550.33	300.33
Optv:	738.99	738.99	350.96	350.96	296.45	296.45

VALUES OF DESIGN VARIABLES :

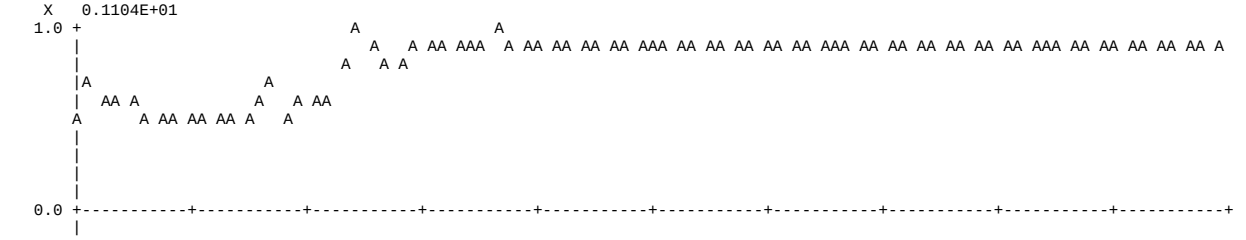
LAYER	DEV01	DEV02	DEV03	DEV04	DEV05	DEV06	DEV07	DEV08	DEV09
1	0.09460	0.16549	0.05000	0.15318	0.22170	0.17325	0.05000	0.06563	0.06392
2	0.11396	0.13766	0.08000	0.14082	0.13967	0.15177	0.16372	0.16463	0.08000
3	1.02025	1.02691	1.00000	1.00000	1.00000	1.03522	1.00000	1.00000	1.00000
4	0.05000	0.10737	0.05000	0.07784	0.15291	0.09079	0.06525	0.06200	0.05000
5	0.10929	0.07403	0.05000	0.07269	0.06720	0.06555	0.05000	0.05000	0.05000

THE ORIGINAL OBJECTIVE FUNCTION = 293.9654846

THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.9512293

THE TOTAL OPTIMAL WEIGHT = 8.93290402E+05

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



OPTIMAL STRUCTURES OF TPS FOR PATCH = 10
(WITH AVERAGE THICKNESS)

HRSI COAT	thin skin	0.11533 in.	739.0 F
AB312 Fabric	slab	0.13028 in.	739.0 F
Q-Felt(3.5 PCF)	thin skin	1.00949 in.	351.0 F
AB312 Fabric	slab	0.07848 in.	351.0 F
RTV-560	thin skin	0.06544 in.	296.4 F
ALUMINUM 2024-T4	slab	0.15000 in.	296.4 F

THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH = 10

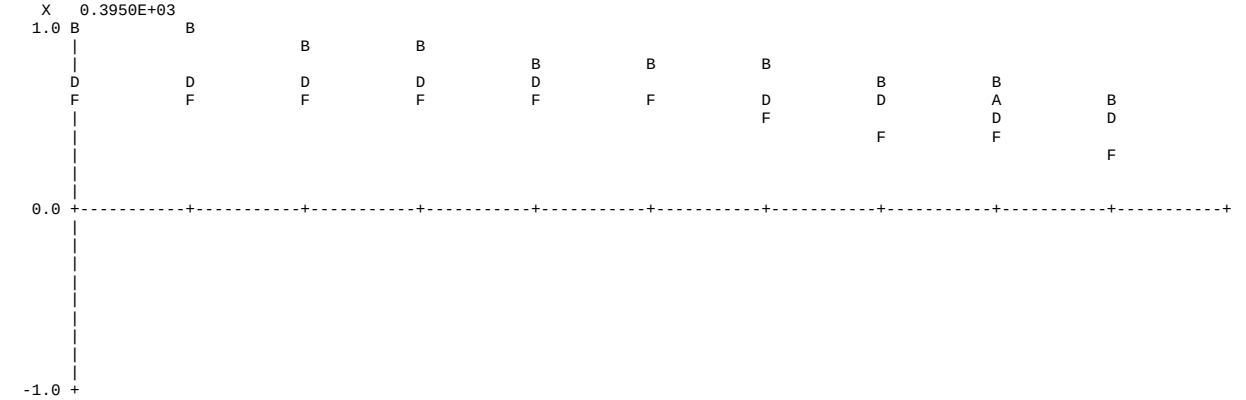
PANEL	LAYER01		LAYER02		LAYER03		LAYER04		LAYER05		LAYER06	
1030	0.06392	464.58	0.08000	464.58	1.00000	386.17	0.05000	307.75	0.05000	295.47	0.15000	283.19
1031	0.07003	560.77	0.11244	560.77	1.00073	441.13	0.05617	321.48	0.05050	303.45	0.15000	285.42
1032	0.06928	659.76	0.14132	659.76	1.00015	498.96	0.05980	338.16	0.05026	314.90	0.15000	291.63
1033	0.06563	738.99	0.16463	738.99	1.00000	544.98	0.06200	350.96	0.05000	323.71	0.15000	296.45
1034	0.06221	738.99	0.17601	738.99	0.99998	544.98	0.06461	350.96	0.05002	323.71	0.15000	295.81
1035	0.05580	738.99	0.17339	738.99	0.99999	544.98	0.06549	349.21	0.05001	320.57	0.15000	291.93
1036	0.05000	718.22	0.16372	718.22	1.00000	529.64	0.06525	341.06	0.05000	314.22	0.15000	287.39
1070	0.08589	449.84	0.09547	449.84	1.00663	371.34	0.05840	292.83	0.05299	279.08	0.15000	265.32
1071	0.09608	530.71	0.12291	530.71	1.00489	417.69	0.06968	304.67	0.05355	284.69	0.15000	264.72
1072	0.09842	609.50	0.14493	609.50	1.00167	464.20	0.07722	318.91	0.05321	293.72	0.15000	268.53
1073	0.09543	671.77	0.16181	671.77	0.99920	500.89	0.08040	330.02	0.05261	301.36	0.15000	272.70
1074	0.08901	700.12	0.17028	700.12	0.99797	516.99	0.07974	333.85	0.05201	304.11	0.15000	274.37
1075	0.07827	687.86	0.16827	687.86	0.99798	508.58	0.07445	329.29	0.05136	301.33	0.15000	273.37
1076	0.07007	661.78	0.16205	661.78	0.99858	492.31	0.06915	322.84	0.05095	297.27	0.15000	271.70
1110	0.11169	428.52	0.11221	428.52	1.01401	351.56	0.06871	274.61	0.05647	259.16	0.15000	243.72
1111	0.12789	487.04	0.13307	487.04	1.00929	385.13	0.08680	283.22	0.05718	261.00	0.15000	238.77
1112	0.13520	538.90	0.14708	538.90	1.00310	416.21	0.09944	293.53	0.05691	266.12	0.15000	238.72
1113	0.13369	580.27	0.15693	580.27	0.99819	441.12	0.10367	301.98	0.05608	271.78	0.15000	241.57
1114	0.12404	604.34	0.16238	604.34	0.99573	455.24	0.09882	306.15	0.05495	275.97	0.15000	245.80
1115	0.10761	598.73	0.16194	598.73	0.99585	450.60	0.08486	302.47	0.05369	275.66	0.15000	248.86
1116	0.08749	611.16	0.16029	611.16	0.99752	458.79	0.07236	306.43	0.05218	282.04	0.15000	257.66
1150	0.13763	402.15	0.12779	402.15	1.02129	328.54	0.07927	254.93	0.05996	237.89	0.15000	220.86
1151	0.15997	434.17	0.14073	434.17	1.01343	347.00	0.10439	259.83	0.06082	235.57	0.15000	211.31
1152	0.17256	457.49	0.14678	457.49	1.00466	361.59	0.12187	265.69	0.06079	236.39	0.15000	207.10
1153	0.17312	478.08	0.15044	478.08	0.99781	374.53	0.12692	270.98	0.06011	239.60	0.15000	208.21
1154	0.16183	495.68	0.15325	495.68	0.99432	385.03	0.11852	274.38	0.05895	244.07	0.15000	213.76
1155	0.13983	498.53	0.15463	498.53	0.99445	385.15	0.09566	271.77	0.05766	246.37	0.15000	220.97
1156	0.12425	495.26	0.15480	495.26	0.99616	381.86	0.07824	268.45	0.05694	247.04	0.15000	225.63
1190	0.15856	375.89	0.14010	375.89	1.02768	306.30	0.08743	236.71	0.06289	218.57	0.15000	200.42
1191	0.18496	383.84	0.14512	383.84	1.01719	311.30	0.11781	238.76	0.06378	213.24	0.15000	187.73
1192	0.20136	384.11	0.14491	384.11	1.00703	312.57	0.13847	241.03	0.06413	210.75	0.15000	180.46
1193	0.20455	387.27	0.14420	387.27	0.99938	315.24	0.14448	243.21	0.06414	211.35	0.15000	179.50
1194	0.19413	396.86	0.14478	396.86	0.99525	320.94	0.13500	245.01	0.06381	214.79	0.15000	184.56
1195	0.16932	405.53	0.14656	405.53	0.99485	324.38	0.10744	243.24	0.06360	218.66	0.15000	194.08
1196	0.14601	409.99	0.14832	409.99	0.99700	324.92	0.08004	239.85	0.06377	221.07	0.15000	202.28
1230	0.17063	356.03	0.14815	356.03	1.03248	289.36	0.09126	222.69	0.06479	204.11	0.15000	185.53
1231	0.19837	347.33	0.14673	347.33	1.02031	285.45	0.12443	223.58	0.06555	197.71	0.15000	171.84
1232	0.21650	333.80	0.14286	333.80	1.01009	278.82	0.14629	223.84	0.06634	193.52	0.15000	163.20
1233	0.22189	325.84	0.14000	325.84	1.00303	274.78	0.15307	223.71	0.06738	192.10	0.15000	160.49
1234	0.21395	328.65	0.13904	328.65	0.99901	276.35	0.14502	224.06	0.06839	194.05	0.15000	164.03
1235	0.19031	338.29	0.13945	338.29	0.99786	280.58	0.11899	222.87	0.07009	198.10	0.15000	173.34
1236	0.15318	354.21	0.14082	354.21	1.00000	287.23	0.07784	220.25	0.07269	203.78	0.15000	187.31
1270	0.17325	345.52	0.15177	345.52	1.03522	279.84	0.09079	214.15	0.06555	195.71	0.15000	177.26
1271	0.20230	326.13	0.14570	326.13	1.02158	270.65	0.12680	215.16	0.06618	189.25	0.15000	163.34
1272	0.22066	324.27	0.14045	306.11	1.01217	260.32	0.14819	214.54	0.06749	184.55	0.15000	159.69
1273	0.22558	324.27	0.13758	295.20	1.00671	254.29	0.15335	213.38	0.06960	182.59	0.15000	159.69
1274	0.21801	324.27	0.13628	295.23	1.00385	253.91	0.14498	212.60	0.07210	183.59	0.15000	159.69
1275	0.19395	324.27	0.13534	305.52	1.00293	258.54	0.11955	211.55	0.07594	187.63	0.15000	163.72
1276	0.15079	328.47	0.13384	328.47	1.00409	269.60	0.07572	210.74	0.08145	195.42	0.15000	180.10
1310	0.17107	341.15	0.15083	341.15	1.03463	275.90	0.09077	210.65	0.06537	191.99	0.15000	173.32
1311	0.19984	324.27	0.14280	316.08	1.02150	263.98	0.12634	211.87	0.06601	186.12	0.15000	160.38
1312	0.21772	324.27	0.13830	295.19	1.01379	253.06	0.14596	210.94	0.06791	181.57	0.15000	159.69
1313	0.22192	324.27	0.13648	285.09	1.01008	247.22	0.14942	209.35	0.07096	179.53	0.15000	159.69
1314	0.21403	324.27	0.13545	285.27	1.00845	246.69	0.14053	208.11	0.07468	180.17	0.15000	159.69
1315	0.18925	324.27	0.13352	296.65	1.00797	251.94	0.11565	207.23	0.08038	184.24	0.15000	161.25
1316	0.14178	324.27	0.12871	323.31	1.00808	265.50	0.07109	207.70	0.08854	193.35	0.15000	178.99
1350	0.16168	342.11	0.14567	342.11	1.03210	276.62	0.08796	211.14	0.06426	192.63	0.15000	174.13

1351	0.19220	324.27	0.13872	313.61	1.02091	262.71	0.12301	211.81	0.06529	186.57	0.15000	161.32
1352	0.21098	324.27	0.13640	293.21	1.01531	251.74	0.14141	210.28	0.06794	181.71	0.15000	159.69
1353	0.21520	324.27	0.13604	284.60	1.01315	246.46	0.14384	208.32	0.07188	179.49	0.15000	159.69
1354	0.20713	324.27	0.13547	285.84	1.01246	246.36	0.13469	206.89	0.07659	179.97	0.15000	159.69
1355	0.18195	324.27	0.13280	298.26	1.01219	252.23	0.11048	206.20	0.08368	184.07	0.15000	161.93
1356	0.13222	326.11	0.12507	326.11	1.01117	266.78	0.06651	207.44	0.09374	193.81	0.15000	180.18
1390	0.14211	350.09	0.13452	350.09	1.02668	283.44	0.08144	216.80	0.06183	198.91	0.15000	181.02
1391	0.17754	324.27	0.13264	318.79	1.01968	266.97	0.11595	215.14	0.06383	190.85	0.15000	166.55
1392	0.19946	324.27	0.13431	298.51	1.01708	255.25	0.13385	211.99	0.06762	184.54	0.15000	159.69
1393	0.20531	324.27	0.13600	290.61	1.01655	249.88	0.13623	209.16	0.07266	181.48	0.15000	159.69
1394	0.19797	324.27	0.13594	292.25	1.01647	249.79	0.12748	207.33	0.07837	181.51	0.15000	159.69
1395	0.17307	324.27	0.13242	304.63	1.01600	255.62	0.10437	206.61	0.08664	185.38	0.15000	164.14
1396	0.12280	331.67	0.12207	331.67	1.01369	269.94	0.06207	208.22	0.09803	195.20	0.15000	182.19
1430	0.10514	369.92	0.11287	369.92	1.01610	300.65	0.06888	231.39	0.05713	214.82	0.15000	198.25
1431	0.15057	336.62	0.12270	336.62	1.01712	280.45	0.10263	224.28	0.06105	201.67	0.15000	179.07
1432	0.17900	324.27	0.13157	315.58	1.01944	266.58	0.12066	217.57	0.06673	191.90	0.15000	166.23
1433	0.18869	324.27	0.13648	306.82	1.02124	259.76	0.12398	212.69	0.07342	186.70	0.15000	160.71
1434	0.18348	324.27	0.13708	307.21	1.02187	258.50	0.11664	209.79	0.08054	185.46	0.15000	161.12
1435	0.15994	324.27	0.13223	317.51	1.02089	263.01	0.09573	208.51	0.09035	188.43	0.15000	168.34
1436	0.11008	341.40	0.11830	341.40	1.01677	275.77	0.05641	210.13	0.10331	197.82	0.15000	185.50
1470	0.05000	403.17	0.08000	403.17	1.00000	329.73	0.05000	256.29	0.05000	241.82	0.15000	227.35
1471	0.11117	369.51	0.10918	369.51	1.01311	304.83	0.08296	240.16	0.05692	219.95	0.15000	199.74
1472	0.14968	346.63	0.12847	346.63	1.02213	287.19	0.10198	227.74	0.06520	204.43	0.15000	181.12
1473	0.16549	334.93	0.13766	334.93	1.02691	277.23	0.10737	219.53	0.07403	195.65	0.15000	171.76
1474	0.16392	331.89	0.13900	331.89	1.02833	273.32	0.10252	214.74	0.08290	192.18	0.15000	169.61
1475	0.14306	337.42	0.13233	337.42	1.02663	274.82	0.08509	212.21	0.09452	193.41	0.15000	174.61
1476	0.09460	355.46	0.11396	355.46	1.02025	284.41	0.05000	213.36	0.10929	201.72	0.15000	190.09

OPTIMIZATION SYSTEM FOR TPSSYM = 11

TOTAL NUMBER OF DESIGN VARIABLES = 30
TOTAL NUMBER OF CONSTRAINS = 1198
TOTAL NUMBER OF TEMP. CONSTRAINS = 858
TOTAL NUMBER OF TEMP. PRINTOUTS = 11

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



MAXIMUM TEMPERATURE OF EVERY LAYER

LAYER:	1	2	3	4	5	6
Tmax:	2300.33	2020.33	1800.33	2020.33	550.33	300.33
Optv:	394.95	394.95	287.23	287.23	255.73	255.73

VALUES OF DESIGN VARIABLES :

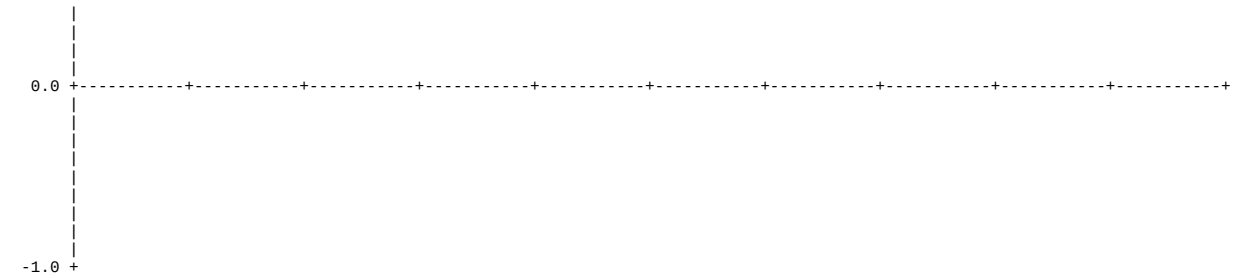
LAYER	DEV01	DEV02	DEV03	DEV04	DEV05	DEV06
1	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000
2	0.08000	0.08000	0.08000	0.08000	0.08000	0.08000
3	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
4	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000
5	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000

THE ORIGINAL OBJECTIVE FUNCTION = 139.8500061

THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.5028006

THE TOTAL OPTIMAL WEIGHT = 3.41962291E+05

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



OPTIMAL STRUCTURES OF TPS FOR PATCH = 11
(WITH AVERAGE THICKNESS)

HRSI COAT	thin skin	0.05000 in.	395.0 F
AB312 Fabric	slab	0.08000 in.	395.0 F
Q-Felt(3.5 PCF)	thin skin	1.00000 in.	287.2 F
AB312 Fabric	slab	0.05000 in.	287.2 F
RTV-560	thin skin	0.05000 in.	255.7 F
ALUMINUM 2024-T4	slab	0.15000 in.	255.7 F

THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH = 11

PANEL	LAYER01		LAYER02		LAYER03		LAYER04		LAYER05		LAYER06	
517	0.05000	185.54	0.08000	185.54	1.00000	158.19	0.05000	130.84	0.05000	119.88	0.15000	108.92
518	0.05000	184.12	0.08000	184.12	1.00000	156.45	0.05000	128.78	0.05000	117.96	0.15000	107.15
519	0.05000	183.00	0.08000	183.00	1.00000	154.96	0.05000	126.92	0.05000	116.24	0.15000	105.57
520	0.05000	181.66	0.08000	181.66	1.00000	153.32	0.05000	124.98	0.05000	114.49	0.15000	104.01
557	0.05000	181.66	0.08000	179.99	1.00000	153.39	0.05000	126.79	0.05000	115.55	0.15000	104.32
558	0.05000	181.66	0.08000	181.18	1.00000	153.53	0.05000	125.87	0.05000	114.83	0.15000	104.01
559	0.05000	182.46	0.08000	182.46	1.00000	153.74	0.05000	125.02	0.05000	114.16	0.15000	104.01
560	0.05000	183.87	0.08000	183.87	1.00000	154.01	0.05000	124.15	0.05000	113.54	0.15000	104.01
597	0.05000	181.66	0.08000	174.61	1.00000	148.76	0.05000	122.92	0.05000	111.21	0.15000	104.01
598	0.05000	181.66	0.08000	179.02	1.00000	151.11	0.05000	123.20	0.05000	111.75	0.15000	104.01
599	0.05000	183.39	0.08000	183.39	1.00000	153.43	0.05000	123.47	0.05000	112.27	0.15000	104.01
600	0.05000	188.38	0.08000	188.38	1.00000	156.09	0.05000	123.80	0.05000	112.92	0.15000	104.01
637	0.05000	181.66	0.08000	177.05	1.00000	150.92	0.05000	124.80	0.05000	112.37	0.15000	104.01
638	0.05000	183.43	0.08000	183.43	1.00000	154.32	0.05000	125.22	0.05000	113.09	0.15000	104.01
639	0.05000	189.93	0.08000	189.93	1.00000	157.83	0.05000	125.72	0.05000	113.89	0.15000	104.01
640	0.05000	197.44	0.08000	197.44	1.00000	161.82	0.05000	126.20	0.05000	114.73	0.15000	104.01
677	0.05000	200.08	0.08000	200.08	1.00000	171.15	0.05000	142.21	0.05000	128.85	0.15000	115.50
678	0.05000	203.59	0.08000	203.59	1.00000	171.64	0.05000	139.69	0.05000	126.59	0.15000	113.50
679	0.05000	207.87	0.08000	207.87	1.00000	172.73	0.05000	137.59	0.05000	124.75	0.15000	111.91
680	0.05000	212.75	0.08000	212.75	1.00000	173.85	0.05000	134.96	0.05000	122.42	0.15000	109.89
717	0.05000	247.91	0.08000	247.91	1.00000	212.27	0.05000	176.63	0.05000	162.37	0.15000	148.11
718	0.05000	242.04	0.08000	242.04	1.00000	204.88	0.05000	167.73	0.05000	153.57	0.15000	139.42
719	0.05000	237.63	0.08000	237.63	1.00000	198.70	0.05000	159.76	0.05000	145.68	0.15000	131.60
720	0.05000	232.65	0.08000	232.65	1.00000	191.70	0.05000	150.75	0.05000	136.76	0.15000	122.76
757	0.05000	302.19	0.08000	302.19	1.00000	259.67	0.05000	217.15	0.05000	202.12	0.15000	187.10
758	0.05000	283.95	0.08000	283.95	1.00000	241.93	0.05000	199.90	0.05000	184.75	0.15000	169.61
759	0.05000	268.20	0.08000	268.20	1.00000	226.38	0.05000	184.56	0.05000	169.27	0.15000	153.98
760	0.05000	251.82	0.08000	251.82	1.00000	210.20	0.05000	168.59	0.05000	153.15	0.15000	137.70
797	0.05000	349.03	0.08000	349.03	1.00000	300.83	0.05000	252.62	0.05000	237.13	0.15000	221.65
798	0.05000	318.55	0.08000	318.55	1.00000	272.85	0.05000	227.15	0.05000	211.31	0.15000	195.46
799	0.05000	291.79	0.08000	291.79	1.00000	248.20	0.05000	204.61	0.05000	188.42	0.15000	172.22
800	0.05000	265.92	0.08000	265.92	1.00000	224.36	0.05000	182.80	0.05000	166.27	0.15000	149.74
837	0.05000	380.30	0.08000	380.30	1.00000	328.26	0.05000	276.23	0.05000	260.55	0.15000	244.86
838	0.05000	341.65	0.08000	341.65	1.00000	293.53	0.05000	245.42	0.05000	229.19	0.15000	212.96
839	0.05000	306.64	0.08000	306.64	1.00000	262.06	0.05000	217.48	0.05000	200.74	0.15000	184.00
840	0.05000	274.39	0.08000	274.39	1.00000	233.03	0.05000	191.68	0.05000	174.49	0.15000	157.31
877	0.05000	394.95	0.08000	394.95	1.00000	341.09	0.05000	287.23	0.05000	271.48	0.15000	255.73
878	0.05000	352.31	0.08000	352.31	1.00000	303.07	0.05000	253.83	0.05000	237.45	0.15000	221.06
879	0.05000	313.04	0.08000	313.04	1.00000	268.05	0.05000	223.07	0.05000	206.10	0.15000	189.12
880	0.05000	278.34	0.08000	278.34	1.00000	237.11	0.05000	195.89	0.05000	178.40	0.15000	160.90

OPTIMIZATION SYSTEM FOR TPSSYM = 12

TOTAL NUMBER OF DESIGN VARIABLES = 30
TOTAL NUMBER OF CONSTRAINS = 856
TOTAL NUMBER OF TEMP. CONSTRAINS = 396
TOTAL NUMBER OF TEMP. PRINTOUTS = 11

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MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
    X   0.4693E+03
   1.0 B
       |           B           B           B
       |
       D                                           B
       F           F           F           F       F           D           D           D
       |                                           F                       B           B           B
       |                                                                   F
       |                                                                               F           F           D
       |                                                                                                       F
       |
   0.0 +-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+
       |
       |
       |
       |
       |
       |
       |
       |
       |
  -1.0 +
       .10         .20         .30         .40         .50         .60         .70         .80         .90         1.00      1.10
                                                              TIME  ( X 1.401E-44 )


              MAXIMUM TEMPERATURE OF EVERY LAYER
LAYER:        1        2        3        4        5        6
Tmax:   2300.33  2020.33  1800.33  2020.33   550.33   300.33
Optv:    469.31   469.31   335.77   335.77   283.75   283.75

                  VALUES OF DESIGN VARIABLES :
LAYER    DEV01    DEV02    DEV03    DEV04    DEV05    DEV06
    1  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000
    2  0.08000  0.08000  0.08000  0.08000  0.08000  0.08000
    3  1.00000  1.00000  1.00000  1.00000  1.00000  1.00000
    4  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000
    5  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000

 THE ORIGINAL OBJECTIVE FUNCTION =     181.8050079

 THE RATIO OF OPTIMAL OBJECTIVE FUNCTION =   0.5028006

 THE TOTAL OPTIMAL WEIGHT = 4.49206701E+05


MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
    X   0.5028E+00
   1.0 A
       |
       |
       |
       |
       |
       |
       |
       |
       |
   0.0 +-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+
       |
       |
       |
       |
       |
       |
       |
       |
       |
  -1.0 +
       1.00        1.10        1.20        1.30        1.40        1.50        1.60        1.70        1.80        1.90      2.00
                                                              TIME  ( X 0.000E+00 )

              OPTIMAL STRUCTURES OF TPS FOR PATCH =      12
                    (WITH AVERAGE THICKNESS)
 ============================================================   -----
                      HRSI COAT            thin skin           0.05000 in.   469.3 F
 ============================================================   -----
                                                                  i
                      AB312 Fabric         slab                0.08000 in.   469.3 F
                                                                  i
 ============================================================   -----
                      Q-Felt(3.5 PCF)      thin skin           1.00000 in.   335.8 F
 ============================================================   -----
                                                                  i
                      AB312 Fabric         slab                0.05000 in.   335.8 F
                                                                  i
 ============================================================   -----
                      RTV-560              thin skin           0.05000 in.   283.7 F
 ============================================================   -----
                                                                  i
                      ALUMINUM 2024-T4     slab                0.15000 in.   283.7 F
                                                                  i
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THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH = 12

PANEL	LAYER01		LAYER02		LAYER03		LAYER04		LAYER05		LAYER06	
997	0.05000	469.31	0.08000	469.31	1.00000	402.54	0.05000	335.77	0.05000	309.76	0.15000	283.75
998	0.05000	458.94	0.08000	458.94	1.00000	390.14	0.05000	321.34	0.05000	298.69	0.15000	276.05
999	0.05000	449.62	0.08000	449.62	1.00000	379.00	0.05000	308.37	0.05000	288.75	0.15000	269.13
1000	0.05000	441.24	0.08000	441.24	1.00000	368.98	0.05000	296.72	0.05000	279.82	0.15000	262.91
1037	0.05000	465.14	0.08000	465.14	1.00000	397.97	0.05000	330.80	0.05000	305.70	0.15000	280.61
1038	0.05000	455.83	0.08000	455.83	1.00000	386.87	0.05000	317.91	0.05000	295.80	0.15000	273.69
1039	0.05000	447.20	0.08000	447.20	1.00000	376.57	0.05000	305.95	0.05000	286.62	0.15000	267.28
1040	0.05000	439.02	0.08000	439.02	1.00000	366.84	0.05000	294.66	0.05000	277.93	0.15000	261.21
1077	0.05000	457.48	0.08000	457.48	1.00000	389.65	0.05000	321.82	0.05000	298.33	0.15000	274.83
1078	0.05000	449.45	0.08000	449.45	1.00000	380.19	0.05000	310.93	0.05000	289.89	0.15000	268.86
1079	0.05000	441.92	0.08000	441.92	1.00000	371.28	0.05000	300.65	0.05000	281.96	0.15000	263.26
1080	0.05000	434.54	0.08000	434.54	1.00000	362.53	0.05000	290.52	0.05000	274.15	0.15000	257.78
1117	0.05000	445.43	0.08000	445.43	1.00000	376.76	0.05000	308.08	0.05000	286.92	0.15000	265.75
1118	0.05000	438.99	0.08000	438.99	1.00000	369.35	0.05000	299.72	0.05000	280.34	0.15000	260.96
1119	0.05000	432.84	0.08000	432.84	1.00000	362.23	0.05000	291.62	0.05000	274.00	0.15000	256.39
1120	0.05000	426.52	0.08000	426.52	1.00000	354.84	0.05000	283.17	0.05000	267.43	0.15000	251.68
1157	0.05000	429.59	0.08000	429.59	1.00000	360.12	0.05000	290.65	0.05000	272.25	0.15000	253.86
1158	0.05000	424.60	0.08000	424.60	1.00000	354.66	0.05000	284.72	0.05000	267.44	0.15000	250.16
1159	0.05000	419.73	0.08000	419.73	1.00000	349.28	0.05000	278.83	0.05000	262.69	0.15000	246.54
1160	0.05000	414.39	0.08000	414.39	1.00000	343.33	0.05000	272.26	0.05000	257.42	0.15000	242.58
1197	0.05000	412.61	0.08000	412.61	1.00000	342.62	0.05000	272.62	0.05000	256.91	0.15000	241.20
1198	0.05000	408.60	0.08000	408.60	1.00000	338.59	0.05000	268.58	0.05000	253.43	0.15000	238.29
1199	0.05000	404.70	0.08000	404.70	1.00000	334.65	0.05000	264.60	0.05000	250.02	0.15000	235.45
1200	0.05000	400.22	0.08000	400.22	1.00000	330.08	0.05000	259.93	0.05000	246.06	0.15000	232.18
1237	0.05000	398.92	0.08000	398.92	1.00000	328.81	0.05000	258.71	0.05000	244.90	0.15000	231.08
1238	0.05000	395.37	0.08000	395.37	1.00000	325.62	0.05000	255.87	0.05000	242.26	0.15000	228.64
1239	0.05000	392.04	0.08000	392.04	1.00000	322.62	0.05000	253.20	0.05000	239.77	0.15000	226.35
1240	0.05000	388.14	0.08000	388.14	1.00000	319.08	0.05000	250.02	0.05000	236.83	0.15000	223.65
1277	0.05000	389.86	0.08000	389.86	1.00000	320.11	0.05000	250.36	0.05000	237.43	0.15000	224.50
1278	0.05000	386.76	0.08000	386.76	1.00000	317.55	0.05000	248.34	0.05000	235.44	0.15000	222.53
1279	0.05000	383.86	0.08000	383.86	1.00000	315.17	0.05000	246.47	0.05000	233.58	0.15000	220.70
1280	0.05000	380.48	0.08000	380.48	1.00000	312.38	0.05000	244.27	0.05000	231.41	0.15000	218.55
1317	0.05000	384.91	0.08000	384.91	1.00000	315.63	0.05000	246.35	0.05000	233.66	0.15000	220.97
1318	0.05000	382.01	0.08000	382.01	1.00000	313.36	0.05000	244.71	0.05000	232.00	0.15000	219.28
1319	0.05000	379.39	0.08000	379.39	1.00000	311.31	0.05000	243.23	0.05000	230.50	0.15000	217.76
1320	0.05000	376.31	0.08000	376.31	1.00000	308.90	0.05000	241.48	0.05000	228.72	0.15000	215.96
1357	0.05000	382.23	0.08000	382.23	1.00000	313.37	0.05000	244.51	0.05000	231.81	0.15000	219.11
1358	0.05000	379.52	0.08000	379.52	1.00000	311.30	0.05000	243.07	0.05000	230.35	0.15000	217.64
1359	0.05000	377.06	0.08000	377.06	1.00000	309.41	0.05000	241.76	0.05000	229.03	0.15000	216.31
1360	0.05000	374.12	0.08000	374.12	1.00000	307.15	0.05000	240.19	0.05000	227.45	0.15000	214.70
1397	0.05000	380.58	0.08000	380.58	1.00000	312.07	0.05000	243.56	0.05000	230.77	0.15000	217.98
1398	0.05000	377.97	0.08000	377.97	1.00000	310.09	0.05000	242.21	0.05000	229.43	0.15000	216.65
1399	0.05000	375.55	0.08000	375.55	1.00000	308.25	0.05000	240.95	0.05000	228.18	0.15000	215.41
1400	0.05000	372.62	0.08000	372.62	1.00000	306.02	0.05000	239.41	0.05000	226.66	0.15000	213.90
1437	0.05000	378.99	0.08000	378.99	1.00000	310.94	0.05000	242.90	0.05000	229.91	0.15000	216.93
1438	0.05000	376.47	0.08000	376.47	1.00000	309.03	0.05000	241.59	0.05000	228.66	0.15000	215.73
1439	0.05000	374.03	0.08000	374.03	1.00000	307.17	0.05000	240.31	0.05000	227.44	0.15000	214.57
1440	0.05000	371.05	0.08000	371.05	1.00000	304.90	0.05000	238.75	0.05000	225.95	0.15000	213.15
1477	0.05000	377.67	0.08000	377.67	1.00000	310.18	0.05000	242.69	0.05000	229.39	0.15000	216.09
1478	0.05000	375.21	0.08000	375.21	1.00000	308.29	0.05000	241.37	0.05000	228.19	0.15000	215.02
1479	0.05000	372.74	0.08000	372.74	1.00000	306.38	0.05000	240.03	0.05000	226.99	0.15000	213.94
1480	0.05000	369.69	0.08000	369.69	1.00000	304.04	0.05000	238.39	0.05000	225.50	0.15000	212.62

OPTIMIZATION SYSTEM FOR TPSSYM = 13

```
 TOTAL NUMBER OF DESIGN VARIABLES =   45
 TOTAL NUMBER OF CONSTRAINS       = 1702
 TOTAL NUMBER OF TEMP. CONSTRAINS =  792
 TOTAL NUMBER OF TEMP. PRINTOUTS  =   11
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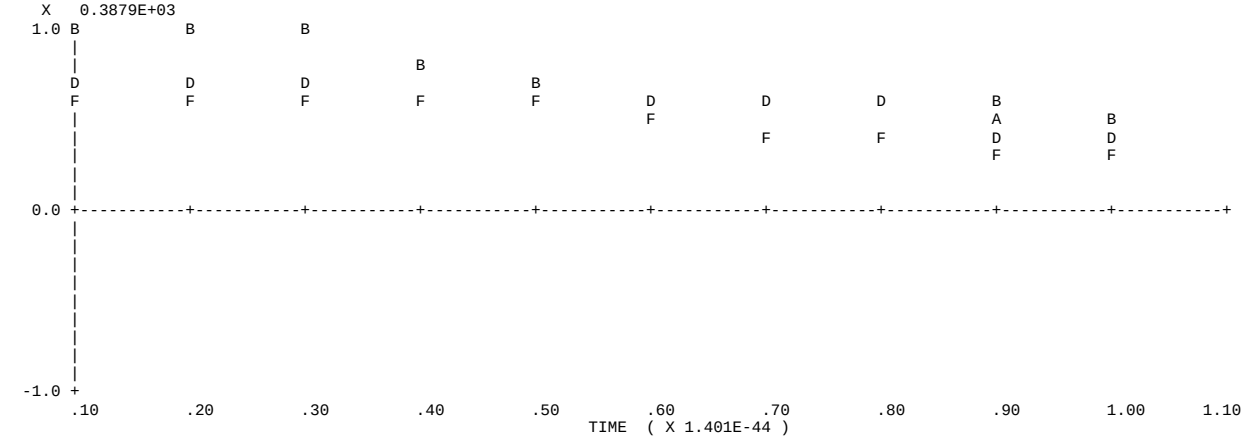
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



MAXIMUM TEMPERATURE OF EVERY LAYER

LAYER:	1	2	3	4	5	6
Tmax:	2300.33	2020.33	1800.33	2020.33	550.33	300.33
Optv:	387.91	387.91	270.21	270.21	236.06	236.06

VALUES OF DESIGN VARIABLES :

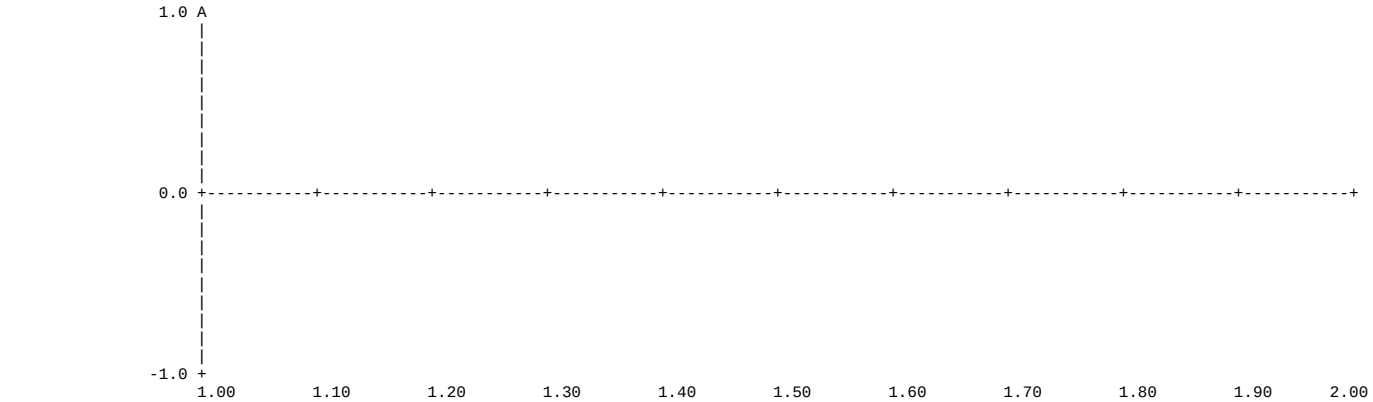
LAYER	DEV01	DEV02	DEV03	DEV04	DEV05	DEV06	DEV07	DEV08	DEV09
1	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000
2	0.08000	0.08000	0.08000	0.08000	0.08000	0.08000	0.08000	0.08000	0.08000
3	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
4	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000
5	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000

THE ORIGINAL OBJECTIVE FUNCTION = 349.5949707

THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.5028266

THE TOTAL OPTIMAL WEIGHT = 3.55799600E+05

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



OPTIMAL STRUCTURES OF TPS FOR PATCH = 13
(WITH AVERAGE THICKNESS)

HRSI COAT	thin skin	0.05000 in.	387.9 F
AB312 Fabric	slab	0.08000 in.	387.9 F
Q-Felt(3.5 PCF)	thin skin	0.99994 in.	270.2 F
AB312 Fabric	slab	0.05000 in.	270.2 F
RTV-560	thin skin	0.05000 in.	236.1 F
ALUMINUM 2024-T4	slab	0.15000 in.	236.1 F

THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH = 13

PANEL	LAYER01		LAYER02		LAYER03		LAYER04		LAYER05		LAYER06	
12	0.05000	302.66	0.08000	302.66	1.00000	261.99	0.05000	221.33	0.05000	208.86	0.15000	196.39
13	0.05000	265.96	0.08000	265.96	1.00000	231.44	0.05000	196.92	0.05000	184.68	0.15000	172.44
14	0.05000	245.56	0.08000	245.56	1.00000	214.07	0.05000	182.57	0.05000	170.45	0.15000	158.33
15	0.05000	238.57	0.08000	238.57	1.00000	207.73	0.05000	176.88	0.05000	164.79	0.15000	152.70
16	0.05000	237.90	0.08000	237.90	1.00000	206.57	0.05000	175.24	0.05000	163.14	0.15000	151.04
52	0.05000	320.99	0.08000	320.99	1.00000	276.19	0.05000	231.39	0.05000	217.99	0.15000	204.59
53	0.05000	275.60	0.08000	275.60	0.99994	239.14	0.05000	202.69	0.05000	190.50	0.15000	178.32
54	0.05000	250.80	0.07999	250.80	0.99992	218.83	0.05000	186.87	0.05000	175.44	0.15000	164.01
55	0.05000	239.81	0.07999	239.81	0.99994	209.97	0.05000	180.13	0.05000	169.12	0.15000	158.11
56	0.05000	237.90	0.08000	235.43	1.00000	206.90	0.05000	178.37	0.05000	167.69	0.15000	157.01
92	0.05000	339.39	0.08000	339.39	1.00000	290.50	0.05000	241.60	0.05000	227.26	0.15000	212.92
93	0.05000	287.46	0.07999	287.46	0.99987	248.67	0.05000	209.88	0.05000	197.72	0.15000	185.55
94	0.05000	258.04	0.07999	258.04	0.99983	225.23	0.05000	192.42	0.05000	181.63	0.15000	170.85
95	0.05000	245.22	0.07999	245.22	0.99987	215.56	0.05000	185.90	0.05000	175.92	0.15000	165.93
96	0.05000	241.98	0.08000	241.98	1.00000	213.96	0.05000	185.94	0.05000	176.36	0.15000	166.78
132	0.05000	356.22	0.08000	356.22	1.00000	303.65	0.05000	251.09	0.05000	235.88	0.15000	220.66
133	0.05000	299.34	0.07999	299.34	0.99981	258.27	0.05000	217.20	0.05000	205.00	0.15000	192.79
134	0.05000	267.18	0.07998	267.18	0.99977	233.09	0.05000	198.99	0.05000	188.65	0.15000	178.31
135	0.05000	256.15	0.07999	256.15	0.99983	225.11	0.05000	194.06	0.05000	184.61	0.15000	175.17
136	0.05000	260.63	0.08000	260.63	1.00000	229.19	0.05000	197.75	0.05000	188.31	0.15000	178.87

172	0.05000	370.07	0.08000	370.07	1.00000	314.58	0.05000	259.09	0.05000	243.13	0.15000	227.17
173	0.05000	310.22	0.07998	310.22	0.99977	267.13	0.05000	224.05	0.05000	211.72	0.15000	199.39
174	0.05000	276.96	0.07998	276.96	0.99973	241.29	0.05000	205.63	0.05000	195.43	0.15000	185.24
175	0.05000	269.77	0.07999	269.77	0.99983	236.18	0.05000	202.59	0.05000	193.08	0.15000	183.58
176	0.05000	288.66	0.08000	288.66	1.00000	250.46	0.05000	212.27	0.05000	202.05	0.15000	191.83
212	0.05000	378.80	0.08000	378.80	1.00000	321.56	0.05000	264.32	0.05000	247.85	0.15000	231.38
213	0.05000	317.98	0.07998	317.98	0.99976	273.51	0.05000	229.04	0.05000	216.56	0.15000	204.07
214	0.05000	284.46	0.07998	284.46	0.99972	247.49	0.05000	210.52	0.05000	200.25	0.15000	189.98
215	0.05000	282.74	0.07999	282.74	0.99984	246.35	0.05000	209.97	0.05000	200.09	0.15000	190.20
216	0.05000	308.95	0.08000	308.95	1.00000	265.45	0.05000	221.94	0.05000	210.90	0.15000	199.86
252	0.05000	382.76	0.08000	382.76	1.00000	324.77	0.05000	266.78	0.05000	250.06	0.15000	233.35
253	0.05000	321.96	0.07998	321.96	0.99975	276.80	0.05000	231.65	0.05000	219.05	0.15000	206.44
254	0.05000	289.11	0.07998	289.11	0.99973	251.29	0.05000	213.47	0.05000	203.09	0.15000	192.72
255	0.05000	289.35	0.07999	289.35	0.99985	251.46	0.05000	213.57	0.05000	203.43	0.15000	193.28
256	0.05000	317.30	0.08000	317.30	1.00000	271.55	0.05000	225.80	0.05000	214.38	0.15000	202.97
292	0.05000	384.84	0.08000	384.84	1.00000	326.48	0.05000	268.12	0.05000	251.27	0.15000	234.42
293	0.05000	324.27	0.07998	324.27	0.99975	278.73	0.05000	233.19	0.05000	220.51	0.15000	207.82
294	0.05000	291.96	0.07998	291.96	0.99973	253.61	0.05000	215.26	0.05000	204.79	0.15000	194.33
295	0.05000	292.97	0.07999	292.97	0.99986	254.24	0.05000	215.51	0.05000	205.20	0.15000	194.89
296	0.05000	321.21	0.08000	321.21	1.00000	274.39	0.05000	227.58	0.05000	215.99	0.15000	204.40
332	0.05000	386.55	0.08000	386.55	1.00000	327.90	0.05000	269.26	0.05000	252.29	0.15000	235.32
333	0.05000	325.69	0.07998	325.69	0.99975	279.91	0.05000	234.13	0.05000	221.40	0.15000	208.66
334	0.05000	294.65	0.07998	294.65	0.99974	255.79	0.05000	216.92	0.05000	206.36	0.15000	195.79
335	0.05000	296.14	0.07999	296.14	0.99987	256.66	0.05000	217.18	0.05000	206.73	0.15000	196.27
336	0.05000	324.15	0.08000	324.15	1.00000	276.53	0.05000	228.92	0.05000	217.19	0.15000	205.46
372	0.05000	387.91	0.08000	387.91	1.00000	329.06	0.05000	270.21	0.05000	253.14	0.15000	236.06
373	0.05000	327.76	0.07998	327.76	0.99976	281.66	0.05000	235.56	0.05000	222.74	0.15000	209.92
374	0.05000	297.15	0.07998	297.15	0.99974	257.80	0.05000	218.46	0.05000	207.79	0.15000	197.12
375	0.05000	298.92	0.07999	298.92	0.99987	258.78	0.05000	218.64	0.05000	208.05	0.15000	197.46
376	0.05000	326.44	0.08000	326.44	1.00000	278.20	0.05000	229.95	0.05000	218.11	0.15000	206.28
412	0.05000	387.91	0.08000	387.91	1.00000	329.06	0.05000	270.21	0.05000	253.14	0.15000	236.06
413	0.05000	329.59	0.07998	329.59	0.99976	283.22	0.05000	236.84	0.05000	223.94	0.15000	211.04
414	0.05000	299.44	0.07998	299.44	0.99975	259.65	0.05000	219.86	0.05000	209.09	0.15000	198.31
415	0.05000	301.35	0.07999	301.35	0.99988	260.63	0.05000	219.91	0.05000	209.19	0.15000	198.48
416	0.05000	328.27	0.08000	328.27	1.00000	279.52	0.05000	230.78	0.05000	218.85	0.15000	206.93
452	0.05000	387.91	0.08000	387.91	1.00000	329.06	0.05000	270.21	0.05000	253.14	0.15000	236.06
453	0.05000	331.94	0.07998	331.94	0.99977	285.24	0.05000	238.53	0.05000	225.50	0.15000	212.47
454	0.05000	302.51	0.07998	302.51	0.99976	262.11	0.05000	221.72	0.05000	210.79	0.15000	199.85
455	0.05000	304.44	0.07999	304.44	0.99989	262.97	0.05000	221.51	0.05000	210.63	0.15000	199.75
456	0.05000	330.36	0.08000	330.36	1.00000	281.04	0.05000	231.72	0.05000	219.69	0.15000	207.67
492	0.05000	387.91	0.08000	387.91	1.00000	329.06	0.05000	270.21	0.05000	253.14	0.15000	236.06
493	0.05000	334.94	0.07998	334.94	0.99979	287.85	0.05000	240.77	0.05000	227.54	0.15000	214.31
494	0.05000	307.11	0.07998	307.11	0.99978	265.79	0.05000	224.47	0.05000	213.27	0.15000	202.08
495	0.05000	309.08	0.07999	309.08	0.99990	266.48	0.05000	223.89	0.05000	212.75	0.15000	201.62
496	0.05000	333.26	0.08000	333.26	1.00000	283.14	0.05000	233.02	0.05000	220.85	0.15000	208.69
532	0.05000	387.48	0.08000	387.48	1.00000	329.06	0.05000	270.21	0.05000	253.14	0.15000	236.06
533	0.05000	337.35	0.07998	337.35	0.99981	290.02	0.05000	242.70	0.05000	229.25	0.15000	215.79
534	0.05000	311.99	0.07998	311.99	0.99981	269.67	0.05000	227.35	0.05000	215.84	0.15000	204.33
535	0.05000	314.21	0.07999	314.21	0.99991	270.35	0.05000	226.49	0.05000	215.07	0.15000	203.64
536	0.05000	336.34	0.08000	336.34	1.00000	285.37	0.05000	234.40	0.05000	222.08	0.15000	209.76
572	0.05000	384.60	0.08000	384.60	1.00000	327.72	0.05000	270.21	0.05000	253.14	0.15000	236.06
573	0.05000	338.99	0.07999	338.99	0.99983	291.56	0.05000	244.14	0.05000	230.48	0.15000	216.82
574	0.05000	316.51	0.07999	316.51	0.99984	273.25	0.05000	229.99	0.05000	218.15	0.15000	206.32
575	0.05000	319.18	0.07999	319.18	0.99993	274.09	0.05000	228.99	0.05000	217.27	0.15000	205.55
576	0.05000	339.30	0.08000	339.30	1.00000	287.51	0.05000	235.72	0.05000	223.26	0.15000	210.79
612	0.05000	380.81	0.08000	380.81	1.00000	325.09	0.05000	269.38	0.05000	252.17	0.15000	234.96
613	0.05000	340.19	0.07999	340.19	0.99986	292.76	0.05000	245.33	0.05000	231.46	0.15000	217.58
614	0.05000	321.01	0.07999	321.01	0.99987	276.80	0.05000	232.58	0.05000	220.40	0.15000	208.21
615	0.05000	324.20	0.08000	324.20	0.99994	277.84	0.05000	231.48	0.05000	219.45	0.15000	207.43
616	0.05000	342.24	0.08000	342.24	1.00000	289.64	0.05000	237.03	0.05000	224.42	0.15000	211.80
652	0.05000	376.28	0.08000	376.28	1.00000	321.89	0.05000	267.51	0.05000	250.42	0.15000	233.34
653	0.05000	340.98	0.07999	340.98	0.99990	293.63	0.05000	246.29	0.05000	232.19	0.15000	218.10
654	0.05000	325.39	0.07999	325.39	0.99990	280.24	0.05000	235.08	0.05000	222.53	0.15000	209.98
655	0.05000	329.12	0.08000	329.12	0.99996	281.52	0.05000	233.91	0.05000	221.57	0.15000	209.23
656	0.05000	345.08	0.08000	345.08	1.00000	291.68	0.05000	238.29	0.05000	225.53	0.15000	212.77
692	0.05000	371.11	0.08000	371.11	1.00000	318.20	0.05000	265.29	0.05000	248.36	0.15000	231.44
693	0.05000	341.41	0.07999	341.41	0.99993	294.22	0.05000	247.02	0.05000	232.71	0.15000	218.40
694	0.05000	329.58	0.07999	329.58	0.99993	283.52	0.05000	237.45	0.05000	224.53	0.15000	211.61
695	0.05000	333.88	0.08000	333.88	0.99997	285.06	0.05000	236.24	0.05000	223.59	0.15000	210.94
696	0.05000	347.83	0.08000	347.83	1.00000	293.66	0.05000	239.50	0.05000	226.60	0.15000	213.70
732	0.05000	365.64	0.08000	365.64	1.00000	314.26	0.05000	262.87	0.05000	246.12	0.15000	229.38
733	0.05000	341.50	0.08000	341.50	0.99996	294.52	0.05000	247.54	0.05000	233.03	0.15000	218.51
734	0.05000	333.45	0.08000	333.45	0.99997	286.53	0.05000	239.62	0.05000	226.34	0.15000	213.05
735	0.05000	338.29	0.08000	338.29	0.99999	288.34	0.05000	238.39	0.05000	225.44	0.15000	212.50
736	0.05000	350.38	0.08000	350.38	1.00000	295.50	0.05000	240.62	0.05000	227.59	0.15000	214.56
772	0.05000	359.57	0.08000	359.57	1.00000	309.86	0.05000	260.15	0.05000	243.60	0.15000	227.06
773	0.05000	341.34	0.08000	341.34	1.00000	294.63	0.05000	247.92	0.05000	233.19	0.15000	218.47
774	0.05000	337.12	0.08000	337.12	1.00000	289.39	0.05000	241.66	0.05000	228.02	0.15000	214.38
775	0.05000	342.34	0.08000	342.34	1.00000	291.34	0.05000	240.34	0.05000	227.12	0.15000	213.90
776	0.05000	352.72	0.08000	352.72	1.00000	297.18	0.05000	241.65	0.05000	228.50	0.15000	215.35

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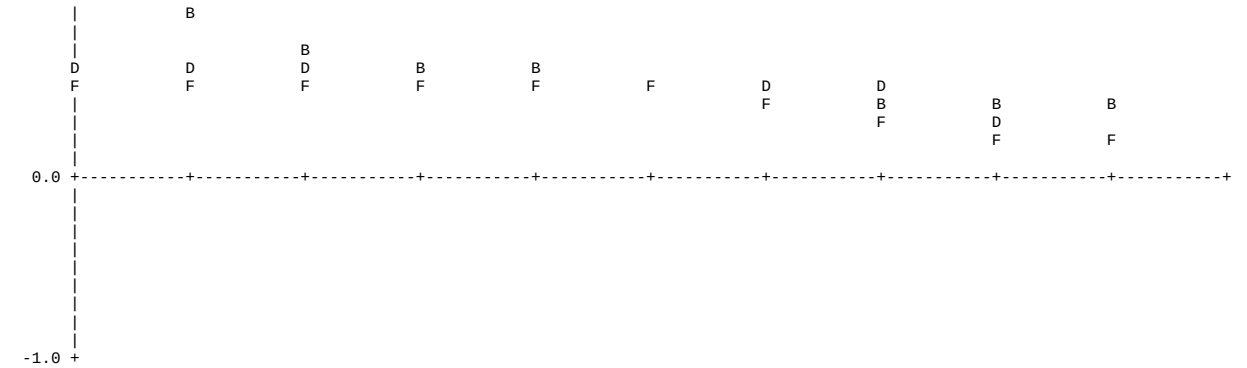
                OPTIMIZATION SYSTEM FOR TPSSYM =    14


 TOTAL NUMBER OF DESIGN VARIABLES =   45
 TOTAL NUMBER OF CONSTRAINS       = 1254
 TOTAL NUMBER OF TEMP. CONSTRAINS =  594
 TOTAL NUMBER OF TEMP. PRINTOUTS  =   11


MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
    X   0.6019E+03
   1.0 B
```



MAXIMUM TEMPERATURE OF EVERY LAYER

LAYER:	1	2	3	4	5	6
Tmax:	2300.33	2020.33	1800.33	2020.33	550.33	300.33
Optv:	601.94	601.94	377.35	377.35	299.37	299.37

VALUES OF DESIGN VARIABLES :

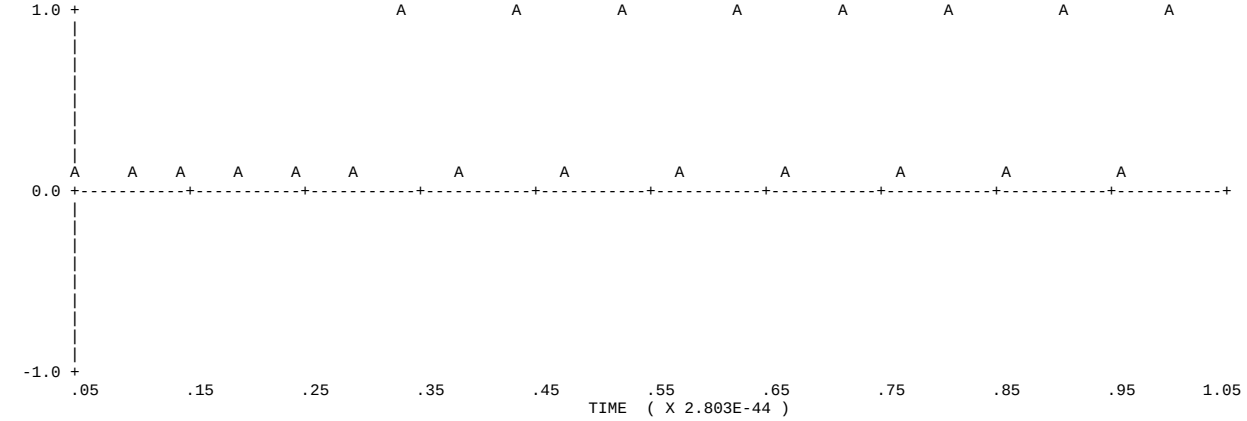
LAYER	DEV01	DEV02	DEV03	DEV04	DEV05	DEV06	DEV07	DEV08	DEV09
1	0.05019	0.05174	0.05280	0.05015	0.05160	0.05231	0.05000	0.05127	0.05177
2	0.08031	0.08278	0.08448	0.08024	0.08255	0.08369	0.08000	0.08203	0.08283
3	1.00388	1.03479	1.05602	1.00296	1.03191	1.04613	1.00000	1.02536	1.03541
4	0.05019	0.05174	0.05280	0.05015	0.05160	0.05231	0.05000	0.05127	0.05177
5	0.05019	0.05174	0.05280	0.05015	0.05160	0.05231	0.05000	0.05127	0.05177

THE ORIGINAL OBJECTIVE FUNCTION = 262.2429810

THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.5173807

THE TOTAL OPTIMAL WEIGHT = 1.53420341E+05

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



OPTIMAL STRUCTURES OF TPS FOR PATCH = 14
(WITH AVERAGE THICKNESS)

HRSI COAT	thin skin	0.05132 in.	601.9 F
AB312 Fabric	slab	0.08210 in.	601.9 F
Q-Felt(3.5 PCF)	thin skin	1.02631 in.	377.3 F
AB312 Fabric	slab	0.05132 in.	377.3 F
RTV-560	thin skin	0.05132 in.	299.4 F
ALUMINUM 2024-T4	slab	0.15000 in.	299.4 F

THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH = 14

PANEL	LAYER01		LAYER02		LAYER03		LAYER04		LAYER05		LAYER06	
892	0.05019	502.16	0.08031	502.16	1.00388	408.78	0.05019	315.40	0.05019	296.86	0.15000	278.32
893	0.05099	450.36	0.08158	437.18	1.01973	355.86	0.05099	274.53	0.05099	262.00	0.15000	249.47
894	0.05174	450.36	0.08278	450.36	1.03479	366.58	0.05174	282.81	0.05174	265.63	0.15000	248.44
895	0.05231	513.02	0.08369	513.02	1.04618	417.36	0.05231	321.70	0.05231	294.05	0.15000	266.41
896	0.05280	601.94	0.08448	601.94	1.05602	489.65	0.05280	377.35	0.05280	335.71	0.15000	294.07
932	0.05020	511.98	0.08031	511.98	1.00393	415.99	0.05020	319.99	0.05020	301.01	0.15000	282.03
933	0.05100	457.25	0.08160	457.25	1.01995	371.35	0.05100	285.46	0.05100	271.19	0.15000	256.92
934	0.05173	460.77	0.08277	460.77	1.03468	374.39	0.05173	288.02	0.05173	270.34	0.15000	252.66
935	0.05229	511.54	0.08367	511.54	1.04582	415.78	0.05229	320.02	0.05229	293.20	0.15000	266.38
936	0.05279	597.89	0.08446	597.89	1.05577	486.23	0.05279	374.56	0.05279	333.72	0.15000	292.88
972	0.05020	520.63	0.08031	520.63	1.00393	422.34	0.05020	324.04	0.05020	304.67	0.15000	285.31
973	0.05100	474.30	0.08161	474.30	1.02006	384.52	0.05100	294.75	0.05100	279.01	0.15000	263.27
974	0.05173	470.43	0.08276	470.43	1.03453	381.65	0.05173	292.87	0.05173	274.73	0.15000	256.59
975	0.05227	510.10	0.08363	510.10	1.04543	414.22	0.05227	318.35	0.05227	292.36	0.15000	266.38
976	0.05277	593.24	0.08444	593.24	1.05548	482.30	0.05277	371.36	0.05277	331.44	0.15000	291.51
1012	0.05020	527.77	0.08031	527.77	1.00391	427.58	0.05020	327.38	0.05020	307.70	0.15000	288.02
1013	0.05101	488.52	0.08161	488.52	1.02010	395.51	0.05101	302.50	0.05101	285.54	0.15000	268.58
1014	0.05172	479.33	0.08275	479.33	1.03431	388.34	0.05172	297.34	0.05172	278.77	0.15000	260.21
1015	0.05225	508.66	0.08360	508.66	1.04499	412.66	0.05225	316.65	0.05225	291.53	0.15000	266.40
1016	0.05276	587.54	0.08441	587.54	1.05511	477.49	0.05276	367.44	0.05276	328.64	0.15000	289.84
1052	0.05019	534.08	0.08031	534.08	1.00384	432.22	0.05019	330.35	0.05019	310.39	0.15000	290.42
1053	0.05100	501.22	0.08161	501.22	1.02007	405.32	0.05100	309.42	0.05100	291.37	0.15000	273.33
1054	0.05170	487.69	0.08272	487.69	1.03404	394.62	0.05170	301.55	0.05170	282.58	0.15000	263.62
1055	0.05222	507.21	0.08356	507.21	1.04450	411.07	0.05222	314.94	0.05222	290.69	0.15000	266.44
1056	0.05273	580.45	0.08437	580.45	1.05465	471.51	0.05273	362.56	0.05273	325.16	0.15000	287.76
1092	0.05019	539.72	0.08030	539.72	1.00372	436.37	0.05019	333.02	0.05019	312.80	0.15000	292.58
1093	0.05100	512.37	0.08160	512.37	1.01994	413.94	0.05100	315.50	0.05100	296.51	0.15000	277.52
1094	0.05168	495.36	0.08270	495.36	1.03370	400.39	0.05168	305.42	0.05168	286.09	0.15000	266.75
1095	0.05220	505.79	0.08352	505.79	1.04394	409.51	0.05220	313.23	0.05220	289.87	0.15000	266.50
1096	0.05270	571.77	0.08432	571.77	1.05406	464.18	0.05270	356.58	0.05270	320.90	0.15000	285.22
1132	0.05018	544.64	0.08028	544.64	1.00352	440.00	0.05018	335.37	0.05018	314.93	0.15000	294.49
1133	0.05099	521.90	0.08158	521.90	1.01972	421.30	0.05099	320.71	0.05099	300.91	0.15000	281.12
1134	0.05166	502.23	0.08266	502.23	1.03328	405.56	0.05166	308.90	0.05166	289.24	0.15000	269.58
1135	0.05217	504.43	0.08347	504.43	1.04331	408.01	0.05217	311.60	0.05217	289.09	0.15000	266.58
1136	0.05267	561.63	0.08427	561.63	1.05334	455.62	0.05267	349.60	0.05267	315.93	0.15000	282.26
1172	0.05016	548.81	0.08026	548.81	1.00326	443.09	0.05016	337.38	0.05016	316.75	0.15000	296.13
1173	0.05097	529.79	0.08155	529.79	1.01942	427.41	0.05097	325.03	0.05097	304.58	0.15000	284.13
1174	0.05164	508.21	0.08262	508.21	1.03278	410.08	0.05164	311.95	0.05164	292.00	0.15000	272.06
1175	0.05213	503.19	0.08341	503.19	1.04263	406.63	0.05213	310.08	0.05213	288.38	0.15000	266.68
1176	0.05263	550.62	0.08420	550.62	1.05251	446.32	0.05263	342.02	0.05263	310.53	0.15000	279.05
1212	0.05015	552.23	0.08024	552.23	1.00296	445.64	0.05015	339.04	0.05015	318.27	0.15000	297.50
1213	0.05095	536.03	0.08152	536.03	1.01905	432.24	0.05095	328.44	0.05095	307.49	0.15000	286.53
1214	0.05161	513.22	0.08258	513.22	1.03221	413.86	0.05161	314.50	0.05161	294.33	0.15000	274.16
1215	0.05209	502.10	0.08335	502.10	1.04189	405.42	0.05209	308.73	0.05209	287.77	0.15000	266.80
1216	0.05258	539.53	0.08413	539.53	1.05161	436.96	0.05258	334.38	0.05258	305.10	0.15000	275.83
1252	0.05013	554.89	0.08021	554.89	1.00266	447.61	0.05013	340.34	0.05013	319.46	0.15000	298.57
1253	0.05093	540.58	0.08149	540.58	1.01863	435.76	0.05093	330.94	0.05093	309.63	0.15000	288.31
1254	0.05158	517.13	0.08253	517.13	1.03160	416.82	0.05158	316.52	0.05158	296.17	0.15000	275.82
1255	0.05206	501.23	0.08329	501.23	1.04113	404.43	0.05206	307.63	0.05206	287.28	0.15000	266.94
1256	0.05253	529.19	0.08406	529.19	1.05070	428.23	0.05253	327.27	0.05253	300.05	0.15000	272.83
1292	0.05011	557.00	0.08018	557.00	1.00227	449.20	0.05011	341.39	0.05011	320.43	0.15000	299.37
1293	0.05090	543.69	0.08145	543.69	1.01807	438.18	0.05090	332.66	0.05090	311.12	0.15000	289.58
1294	0.05154	520.15	0.08247	520.15	1.03089	419.12	0.05154	318.09	0.05154	297.61	0.15000	277.13
1295	0.05202	500.54	0.08323	500.54	1.04032	403.63	0.05202	306.72	0.05202	286.91	0.15000	267.10
1296	0.05249	519.39	0.08398	519.39	1.04975	419.96	0.05249	320.53	0.05249	295.26	0.15000	270.00
1332	0.05009	558.29	0.08014	558.29	1.00172	450.19	0.05009	342.10	0.05009	321.09	0.15000	299.37
1333	0.05086	544.87	0.08138	544.87	1.01729	439.11	0.05086	333.34	0.05086	311.76	0.15000	290.17
1334	0.05150	522.28	0.08240	522.28	1.02999	420.76	0.05150	319.23	0.05150	298.67	0.15000	278.12
1335	0.05196	499.97	0.08314	499.97	1.03928	402.94	0.05196	305.91	0.05196	286.62	0.15000	267.32
1336	0.05243	508.20	0.08388	508.20	1.04851	410.52	0.05243	312.84	0.05243	289.81	0.15000	266.78
1372	0.05006	558.19	0.08009	558.19	1.00113	450.17	0.05006	342.15	0.05006	321.16	0.15000	299.37
1373	0.05082	543.44	0.08131	543.44	1.01642	438.02	0.05082	332.60	0.05082	311.20	0.15000	289.80
1374	0.05144	522.97	0.08231	522.97	1.02883	421.31	0.05144	319.66	0.05144	299.11	0.15000	278.55
1375	0.05188	499.67	0.08301	499.67	1.03764	402.51	0.05188	305.35	0.05188	286.52	0.15000	267.70
1376	0.05231	491.22	0.08369	491.22	1.04613	396.21	0.05231	301.19	0.05231	281.58	0.15000	261.98
1412	0.05003	557.21	0.08005	557.21	1.00060	449.50	0.05003	341.78	0.05003	320.85	0.15000	299.37
1413	0.05078	539.90	0.08124	539.90	1.01551	435.31	0.05078	330.71	0.05078	309.68	0.15000	288.65
1414	0.05136	521.23	0.08218	521.23	1.02726	420.07	0.05136	318.90	0.05136	298.49	0.15000	278.08
1415	0.05174	500.48	0.08279	500.48	1.03486	403.21	0.05174	305.95	0.05174	287.16	0.15000	268.37
1416	0.05206	476.06	0.08330	476.06	1.04130	383.47	0.05206	290.88	0.05206	274.46	0.15000	258.04
1452	0.05000	555.40	0.08000	555.40	1.00000	448.22	0.05000	341.04	0.05000	320.20	0.15000	299.37
1453	0.05073	534.55	0.08116	534.55	1.01456	431.20	0.05073	327.84	0.05073	307.34	0.15000	286.83
1454	0.05127	516.16	0.08203	516.16	1.02536	416.32	0.05127	316.48	0.05127	296.40	0.15000	276.31
1455	0.05158	503.03	0.08253	503.03	1.03157	405.81	0.05158	308.59	0.05158	288.89	0.15000	269.18
1456	0.05177	492.55	0.08283	492.55	1.03541	397.50	0.05177	302.46	0.05177	283.12	0.15000	263.79

```
**************************************
***                                ***
*** T P S O P T  T E R M I N A T E D ***
***                                ***
***          N O R M A L L Y       ***
***                                ***
***      17:19:17    09/15/2005    ***
***                                ***
**************************************
```

3.0 Blunt Cone Configuration

- *Purpose*: To demonstrate the capability of the TPSOPT software system to result in a varying optimal thickness distribution over a blunt cone surface.

- *Input File*:
  - Standard input File: CONE_TPS.INP (Listing 3.1)
  - Aerodynamic Database: CFDTABLE.DAT (Listing 3.2)
  - Geometry File: ZNRGEO.DAT (Binary file)
  - ZONAIR Solution File: FLAOWi (Listing 3.3)

- *Output File*:
  - Standard Output File: CONE_TPS.OUT (Listing 3.4)
  - Vehicle Surface Mesh: CONE.NAS (Figure 3.1)
  - Response surfaces for POD analysis (Figure 3.4)
  - C_p and Temperature Plot File: CPTEMP.PLT (Figure 3.5)
  - Thickness Distribution Plot File: CONETHICK.PLT (Figure 3.6)

3.1 The Surface Mesh of a Blunt Cone Configuration

A blunt cone configuration is shown in Figure 3.1. The surface mesh is generated by ZONAIR and outputted as a binary file “ZNRGEO.DAT”. The ZONAIR model consists of 272 panels and 273 grid points. These panels and grid points are stored in the file “ZNRGEO.DAT” which is used in TPSOPT by specifying the name on the second row of the aerodynamic database (CFDTABLE.DAT) that is imported by the “ASSIGN AEROBASE=” executive control command.

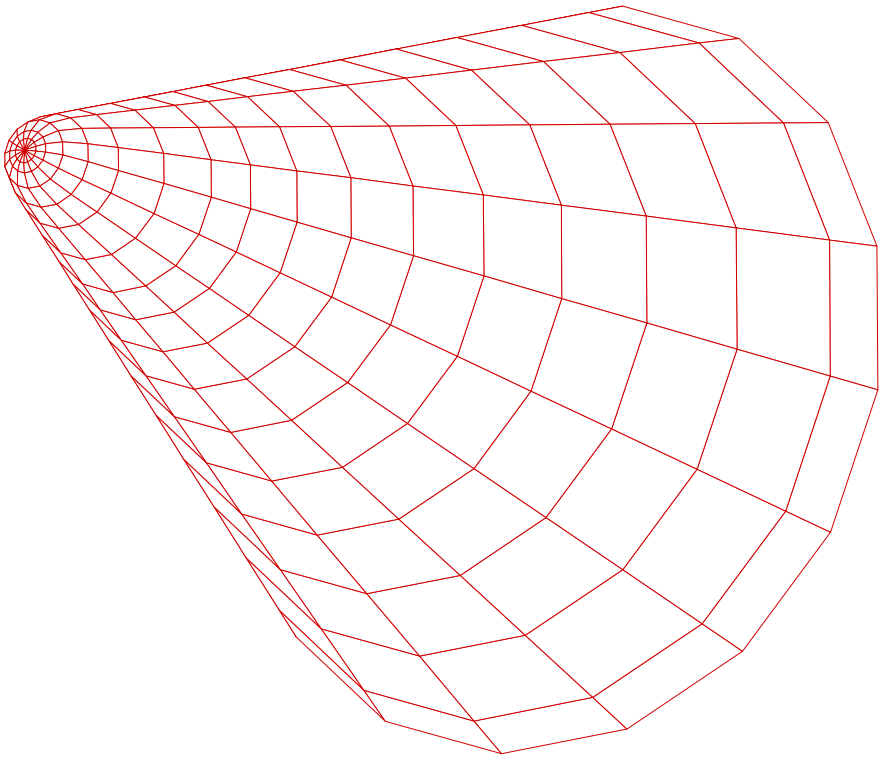


Figure 3.1. Blunt cone surface mesh

3.2 The Aerodynamic Database: CFDTABLE.DAT

The aerodynamic database is generated by running ZONAIR for 55 combinations of 5 Mach numbers (2, 4, 7, 10, 15) and 11 angles of attack (0, 4, 7, 10, 13, 15, 20, 25, 30, 35, 40). This file provides TPSOPT system with all flow field information from ZONAIR. The first row is a title card (CONE); the second row provide the geometry file name (ZNRGEO.DAT); the third and fourth rows list the name of the reference chord, span, …etc, and their values, respectively; the fifth row lists the names of items in the following rows (Mach number, Altitude, Angle of attack, etc.) and the remaining rows contain the values of the items listed in the fifth row and the file names (FLAOW0001-FLAOW55) in the last column which stores the velocity and pressure coefficients for the 55 combinations of Mach number and Angle of attack listed in the corresponding row.

It is noted that the order of the Mach numbers and angles of attack in the table must be ascending.

3.3 The Standard Input File (CONE_TPS.INP)

The standard input file consists of two major parts: the flow field quantities and the TPS optimization system. The flow field quantities are provided by ZONAIR and imported by the aerodynamic database (CFDTABLE.DAT) using the following statement on the first row:

ASSIGN AEROBASE='CFDTABLE.DAT'

The TPS optimization system is the major portion of the standard input file, which includes specification of trajectory data and definition of patches for the TPS. Four patches are defined for the blunt cone configuration (Figure 3.2), among which patches 1 and 2 are located around the nose of the vehicle and patches 3 and 4 are defined for the body. Figure 3.3 shows individual patches and panel numbers over them.

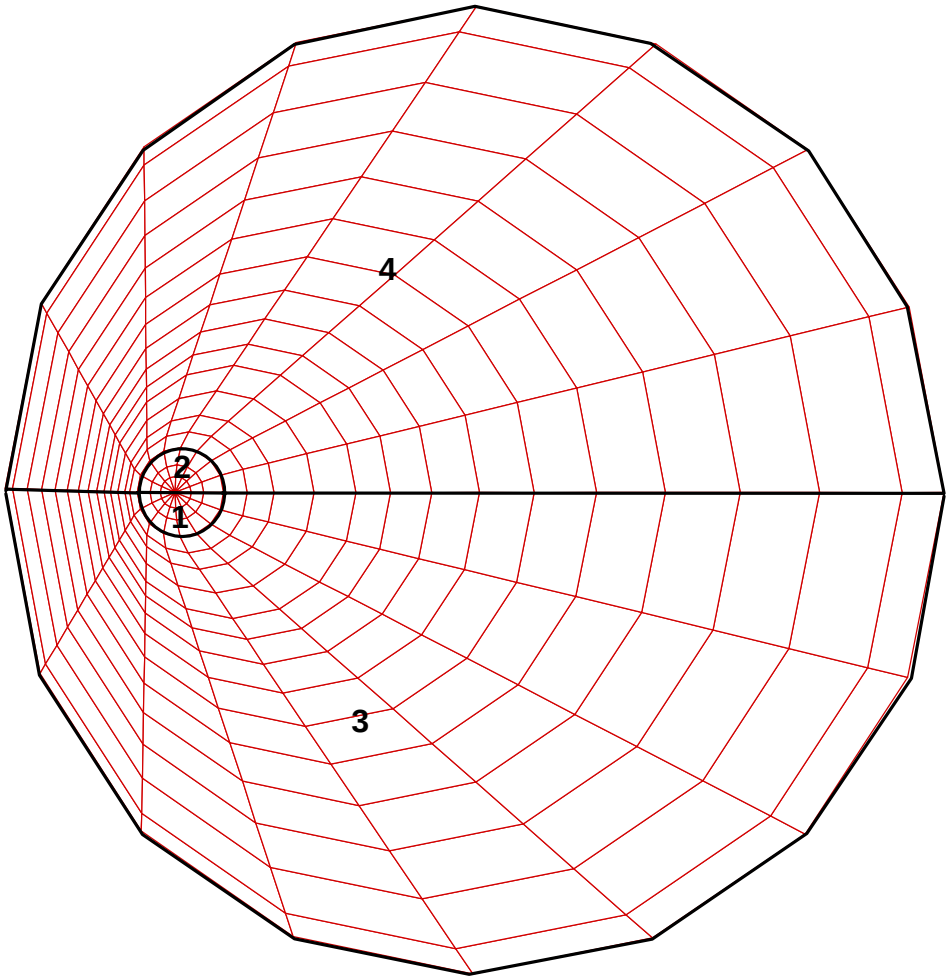
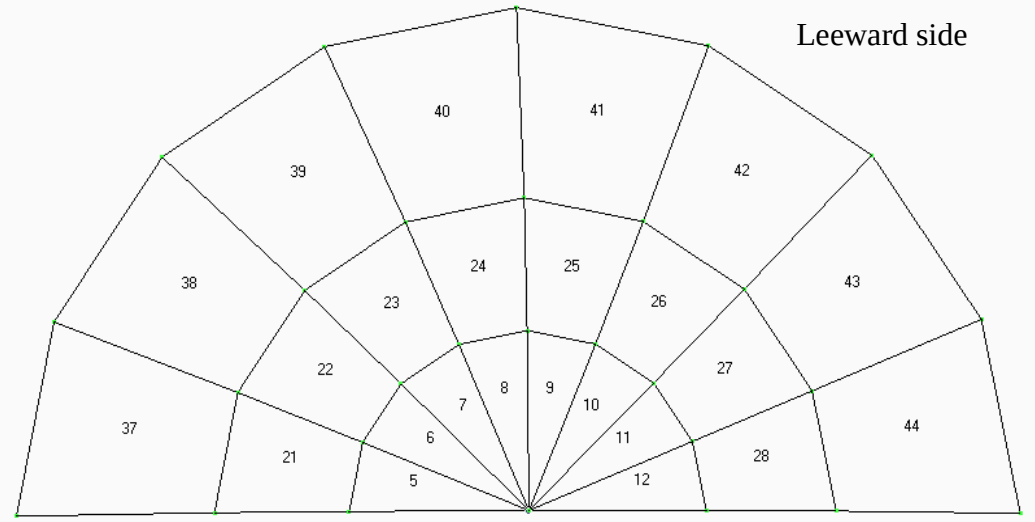
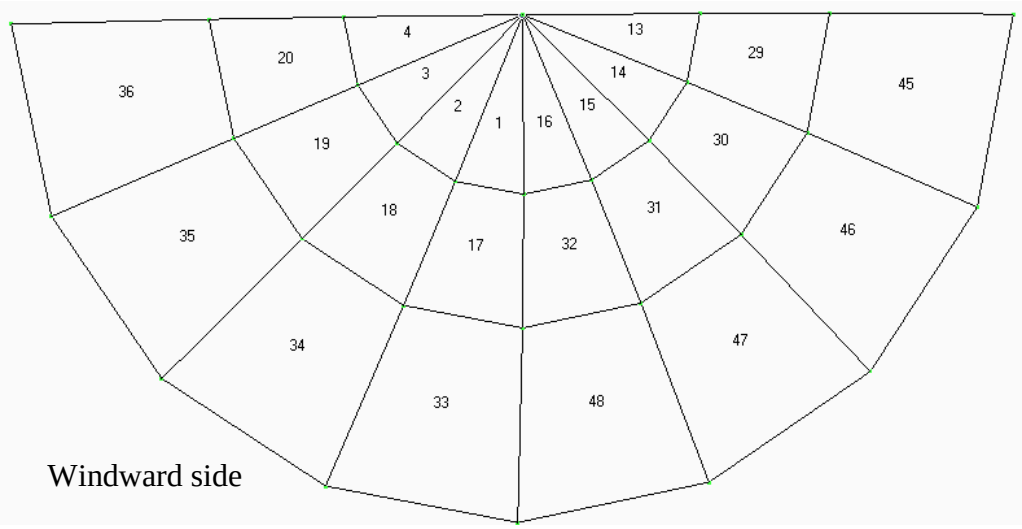


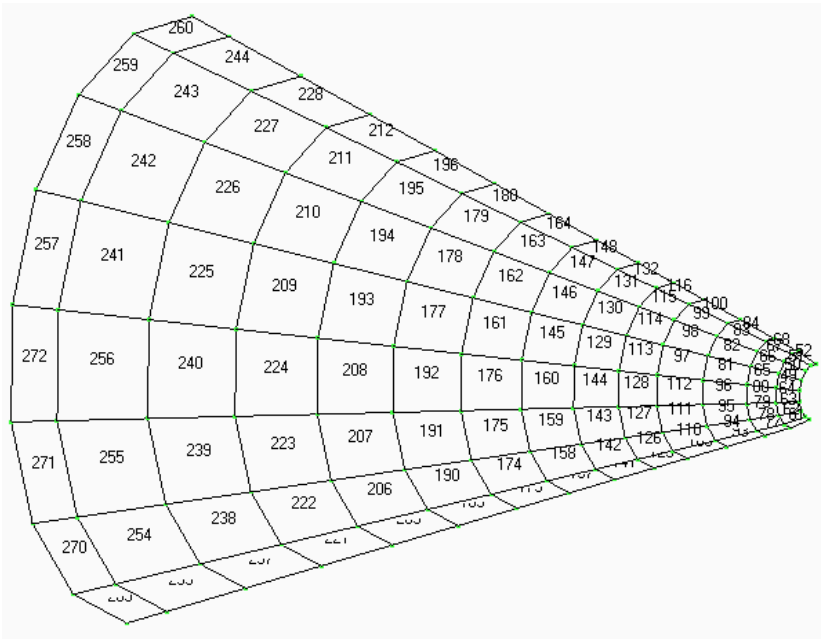
Figure 3.2. Four patches defined over blunt cone surface

Patch 2

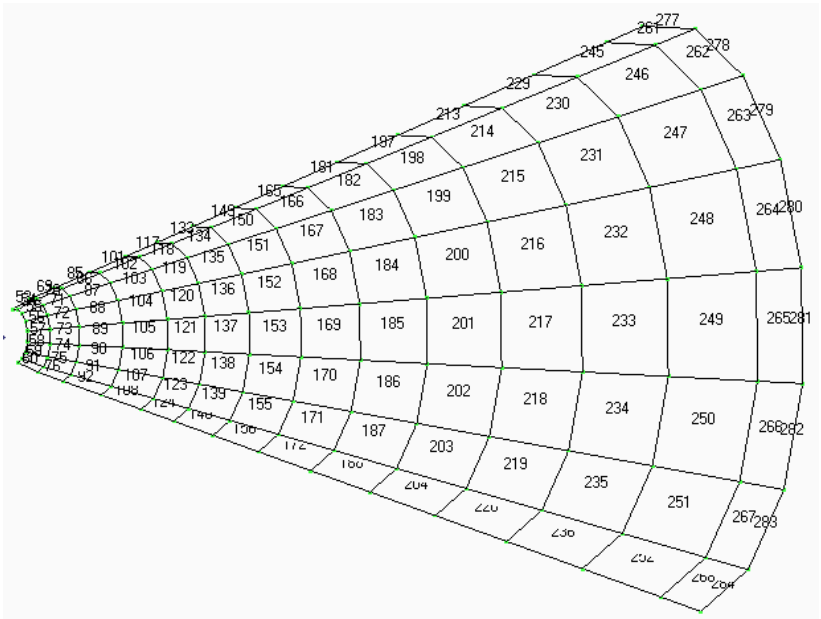




Patch 1



Patch 3



Patch 4

Figure 3.3. Four separated patches defined over the cone surface

3.4 Thermal Structures for Patches

Two sets of 6 layered TPS structures are used for the blunt wedge configuration. The first one is for the nose cap (patches 1 and 2) and the windward surface (patch 3), and the second one for the Leeward surface (patch 4).

The thermal structures specified for the first set TPS using the STTYPE numbers 1, 2, 3, 4, 5 and 6 are Slab, Slab, Thin skin, Slab, Thin skin and Slab, and the corresponding optimization materials are 508 (RCG Coating), 501 (LI-9000), 245 (RTV-560), 313 (5.4LB SIP), 245 (RTV-560) and 103 (Aluminum). The maximum temperatures for these materials are: $2760\,^{0}R$, $2860\,^{0}R$, $1010\,^{0}R$, $910\,^{0}R$, $1010\,^{0}R$, and $810\,^{0}R$. The following is a schematic plot of this TPS.

```
============================================================
                      HRSI COAT           thin skin
============================================================

                      AB312 Fabric        slab

============================================================

                      Q-Felt(3.5 PCF)     slab

============================================================

                      AB312 Fabric        slab

============================================================
                      RTV-560             thin skin
============================================================

                      ALUMINUM 7075-T6    slab

============================================================
```

The structures specified for the second set TPS is the AFRSI (Advanced Flexible Reusable Surface Insulation) TPS which consists of 6 layers: Thin skin, Slab, Slab, Slab, Thin skin and Slab denoted by the STTYPE numbers 31, 32, 33, 34, 35 and 36. The corresponding optimization materials are 221 (HRSI COAT), 266 (AB312 Fabric), 260 (Q-Felt), 266 (AB312 Fabric), 245 (RTV-560) and 103 (Aluminum) and the maximum temperatures for these materials are: $2760\,^{0}R$, $2480\,^{0}R$, $2480\,^{0}R$, $2260\,^{0}R$, and $810\,^{0}R$. The following is a schematic plot of this TPS.

```
============================================================

                      RCG COATING          slab

============================================================

                      LI900                slab

============================================================
                      RTV-560              thin skin
============================================================

                      5.4 LB SIP           slab

============================================================
                      RTV-560              thin skin
============================================================

                      ALUMINUM 7075-T6     slab

============================================================
```

The sixth layer of both sets of TPS is defined as the structure layer, which means that the thickness of the sixth layer is constant during the computation of optimization.

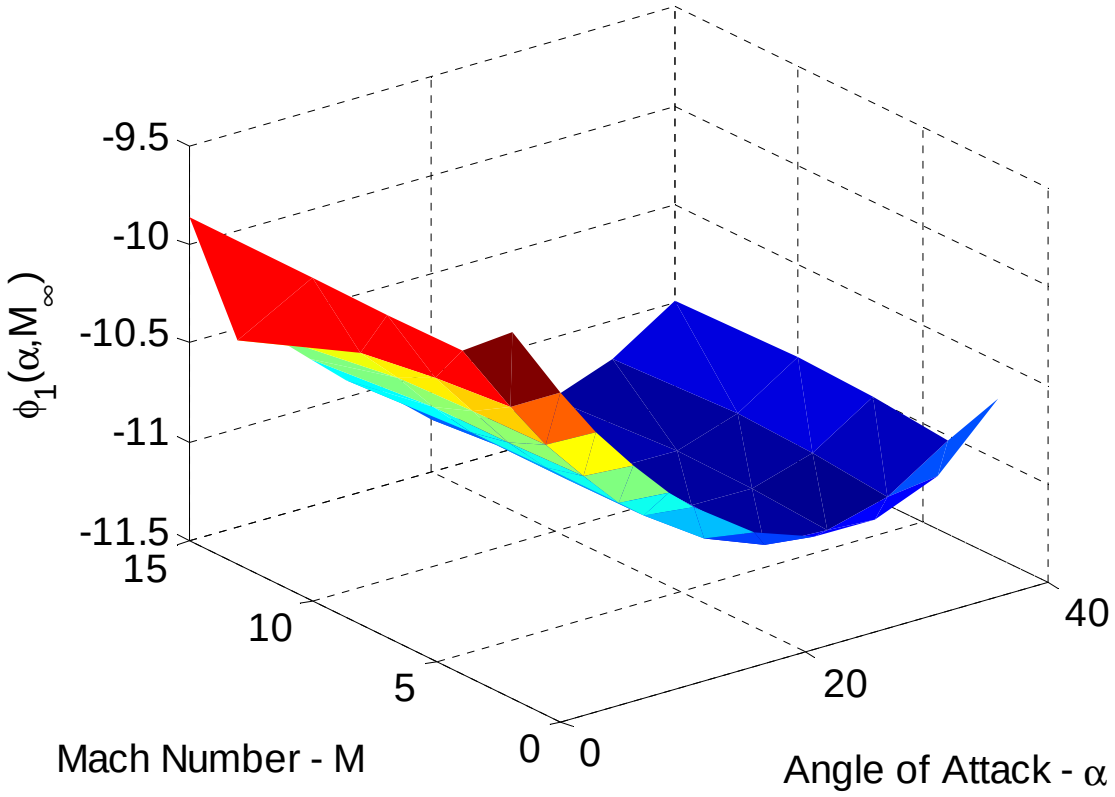
3.5 Output Information

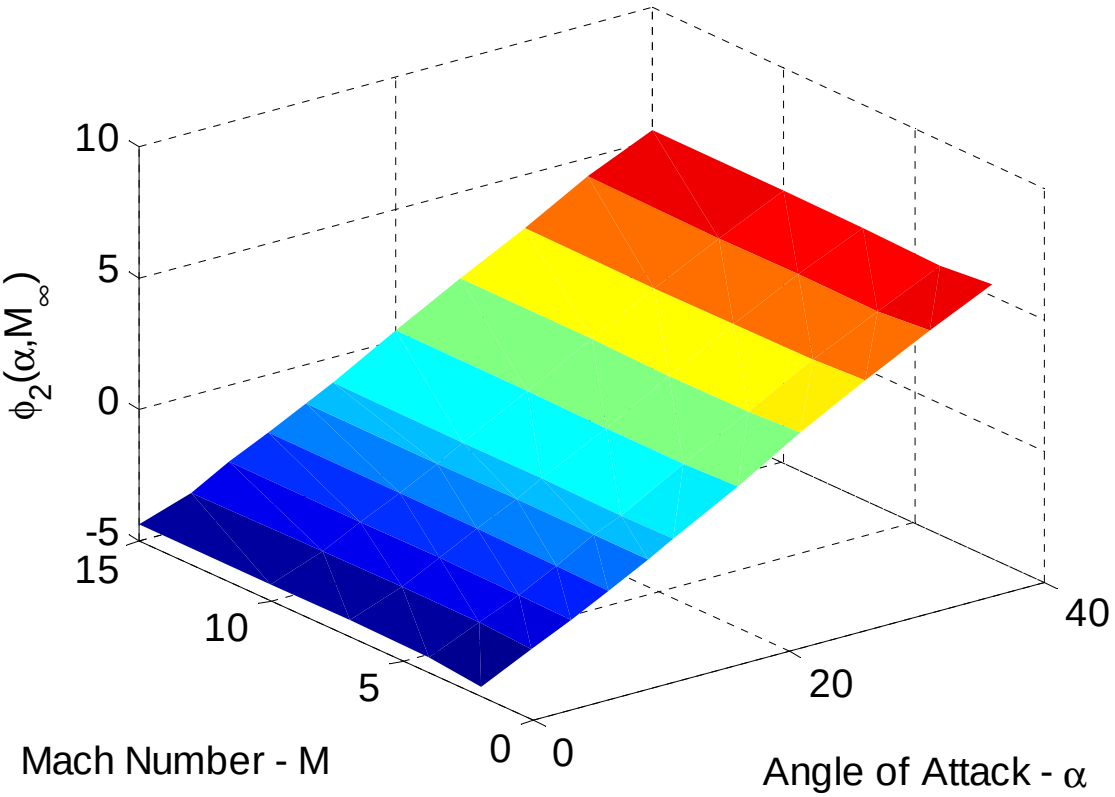
The output information consists of the following items:

(1) Response surfaces of C_p and velocities for POD analysis (Plot files).
(2) C_p and temperature for specified times in trajectory bulk data cards (Plot files).
(3) Schematic text plotting of trajectory-related thermal thantities versus time over every patch. These quantities include enthalpy-based heat transfer coefficient, adiabatic wall enthalpy, and pressure.
(4) Thickness of every design layer and the ratio of the objective functions between the optimal and initial thickness.
(5) Schematic text plotting of optimal thickness and maximum temperature over each layer for every patch.
(6) Optimal thickness and temperature over each layer for every panel (Plot file).

3.6 Results

The output items listed in Section 3.5 have been stored in a text file and some plotting files. The text file is the Standard Output File (CONE_TPS.OUT) which includes all the input information appearing in the Standard Input File (CONE_TPS.INP) and items (3)-(5) listed in the above section. Figures 3.4-3.6 show the response surfaces of C_p, C_p and temperature specified in trajectory bulk data card, and the optimal thickness, respectively.


-9.5
-10
-10.5
-11
-11.5
$\phi_1(\alpha,M_\infty)$
15
10
5
0
Mach Number - M
0
20
40
Angle of Attack - α


10
5
0
-5
$\phi_2(\alpha,M_\infty)$
15
10
5
0
Mach Number - M
0
20
40
Angle of Attack - α

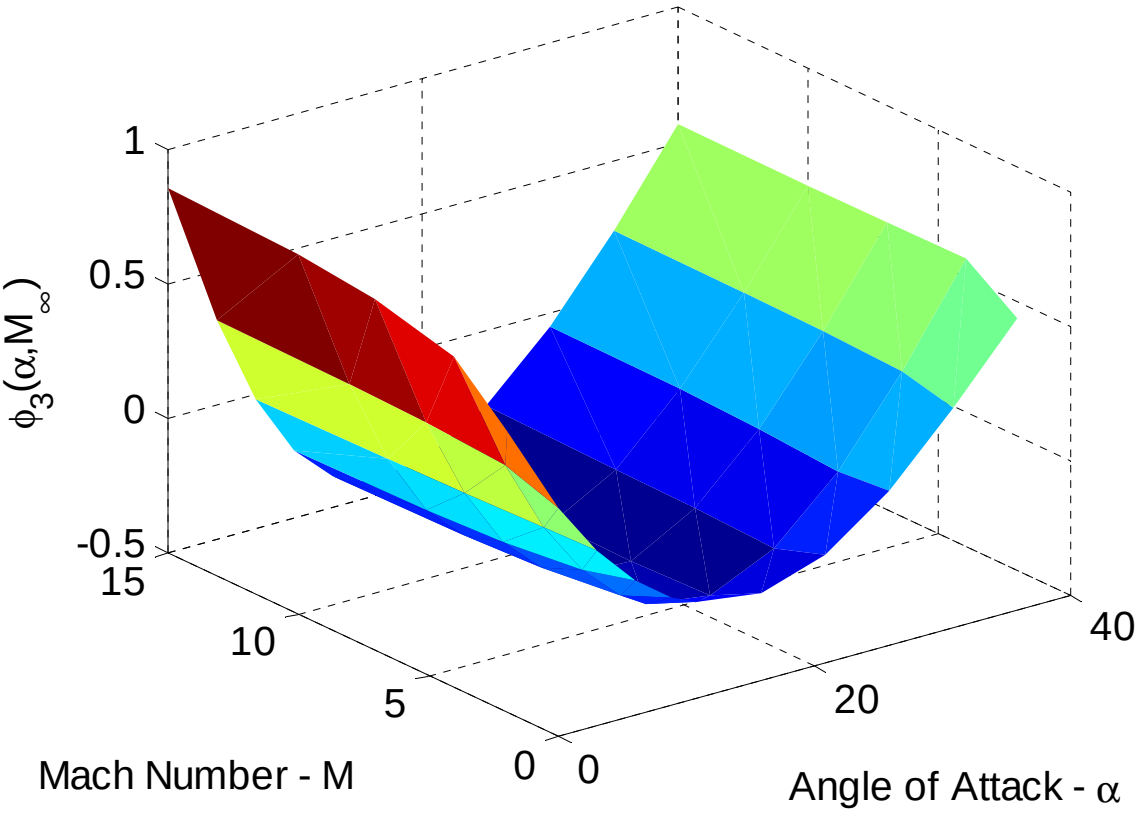


Figure 3.4. Response surface of first three modes for POD analysis

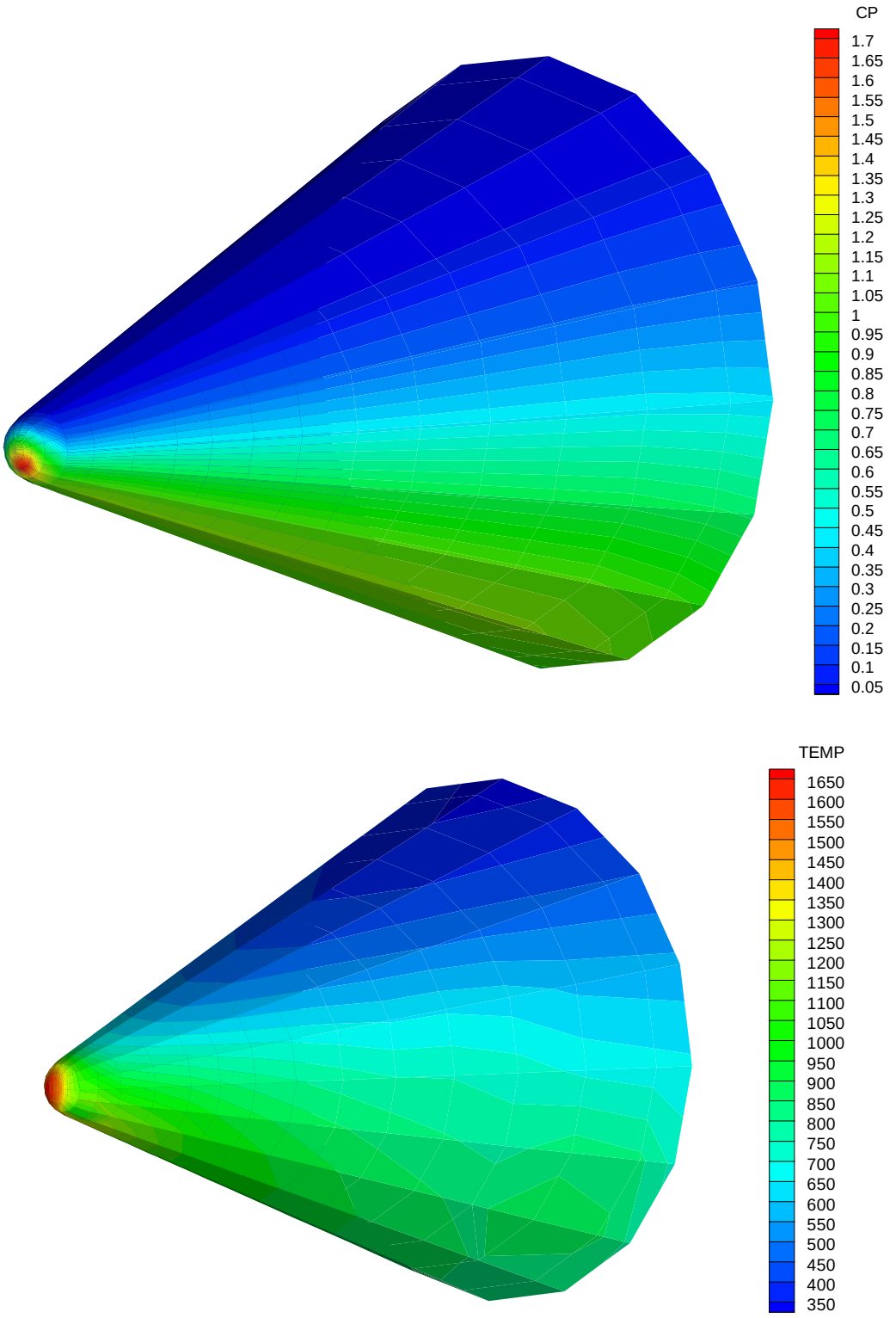
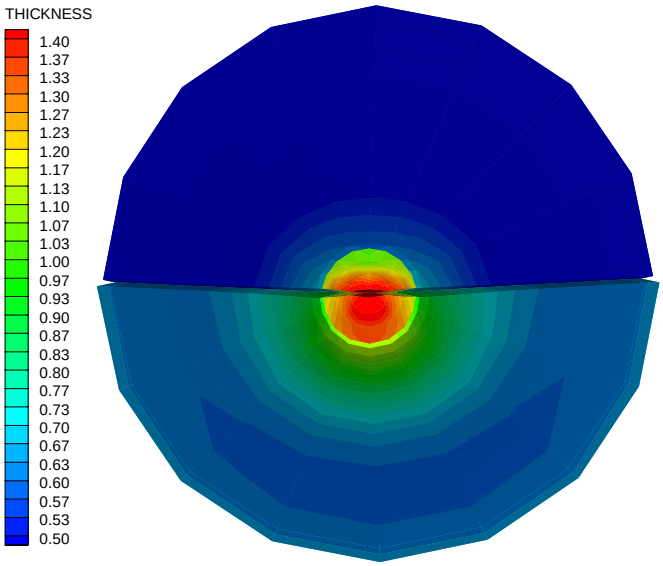
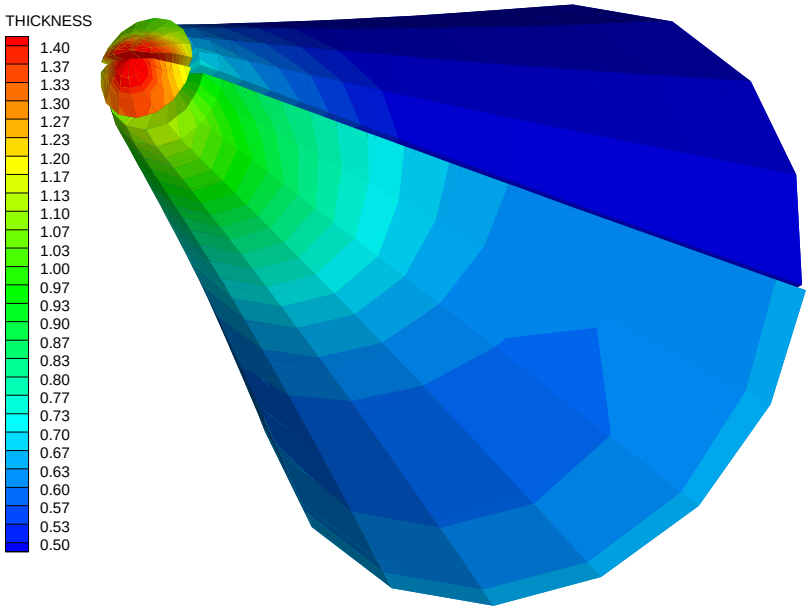


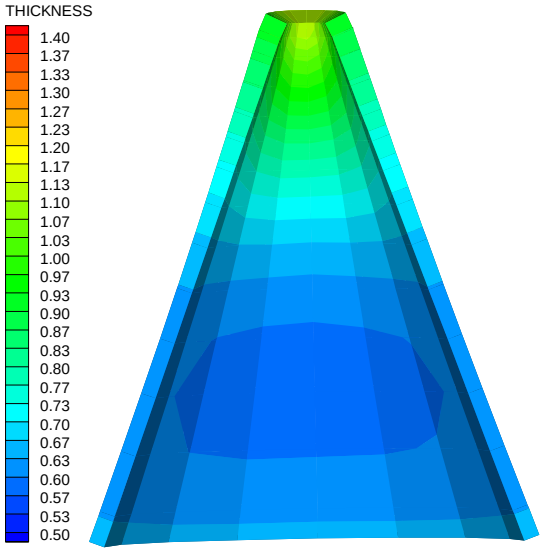
Figure 3.5. Plots of Cp and temperature at time=263 with M=8.4, AoA=30



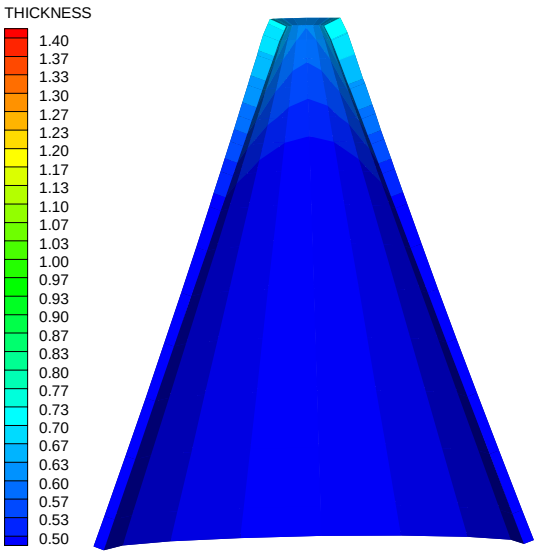
Front view



Side view



Windward side



Leeward side

Figure 3.6. Optimal thickness plot

3.7 Lists of Input and Output Files

- *Input Data Listing:*

Listing 3.1 Standard input File: CONE_TPS.INP

```
ASSIGN AEROBASE='CFDTABLE.DAT',PRINT=0
SOL 1
$ Begin Executive Control Section
CEND
ECHO = SORT
SUBCASE = 1
        SUBTITLE=BLENT-NOSE  CONE WITH 20 DEG NOSE ANGLE
        LABEL= HYPERSONIC AERODYNAMIC DATABASE BY ZONAIR
        TPSDES=1
$
BEGIN BULK
$
PLTAERO 1       YES     NO              NASTRAN AEROMESH.NAS
$ POLTTING TPS THICKNESS
PLTTPS  -1      1       ALL     TECPLOT  CONE1L.PLT      -1.0
PLTTPS   2      1       ALL     TECPLOT  CONEML.PLT       0.05
$
$PODRSM |TPSDES |METHOD |NRDMOD |TOLER  |NEURON |SAVE   |FILENM
PODRSM  1       1                        SAVE    CONEM1.RST     CONT
CONT    CPPODRSM.P3D    UPODRSM.P3D      VPODRSM.P3D     WPODRSM.P3D
$
$TPSDES SETID   PODRSM  TRJLST  IFPREH  IDFEM/TPSSYM                    CONT
TPSDES  1       1       1       1
CONT    1       2       3       4
$
$TPSSYM SETID   IDPATCH  NLAYER  PRVAL                                  CONT
TPSSYM  1        1        6        4                                    CONT
CONT    1        1      0.008   0.05                                   CONT
CONT    1        2      0.5     4.0                                    CONT
CONT    1        3      0.01    0.1                                    CONT
CONT    1        4      0.015   0.2                                    CONT
CONT    1        5      0.01    0.1                                    CONT
CONT    0        6      0.02    0.2
TPSSYM  2        2        6        4                                    CONT
CONT    2        1      0.008   0.05                                   CONT
CONT    2        2      0.5     4.0                                    CONT
CONT    2        3      0.01    0.1                                    CONT
CONT    2        4      0.015   0.2                                    CONT
CONT    2        5      0.01    0.1                                    CONT
CONT    0        6      0.02    0.2
TPSSYM  3        3        6        4                                    CONT
CONT    3        1      0.008   0.05                                   CONT
CONT    3        2      0.5     4.0                                    CONT
CONT    3        3      0.01    0.1                                    CONT
CONT    3        4      0.015   0.2                                    CONT
CONT    3        5      0.01    0.1                                    CONT
CONT    0        6      0.02    0.2
TPSSYM  4        4        6        4                                    CONT
CONT    4        31     0.003   0.1                                    CONT
CONT    4        32     0.004   0.1                                    CONT
CONT    4        33     0.2     5.0                                    CONT
CONT    4        34     0.015   1.0                                    CONT
CONT    4        35     0.005   0.8                                    CONT
CONT    0        36     0.01    1.0
$
$    TILE TPS (Based on First of Fig10 of Chiu adn Pitts paper, 1991)
STTYPE  1        1      508                                            CONT
CONT    0.01
```

```
STTYPE  2        1      501                                              CONT
CONT    1.0
STTYPE  3        6      245                                              CONT
CONT    0.01
STTYPE  4        1      313                                              CONT
CONT    0.05
STTYPE  5        6      245                                              CONT
CONT    0.01
STTYPE  6        1      103                                              CONT
CONT    0.1
$  AFRSI TPS (Based on Fig7 of Myers report, 2000)
STTYPE  31       6      221                                              CONT
CONT    0.05
STTYPE  32       1      266                                              CONT
CONT    0.05
STTYPE  33       1      260                                              CONT
CONT    1.2
STTYPE  34       1      266                                              CONT
CONT    0.2
STTYPE  35       6      245                                              CONT
CONT    0.3
STTYPE  36       1      103                                              CONT
CONT    0.2
$
PRVAL   4              30000000
$
$PATCH  ID      RHSPAN  RHSHOT  LHSPAN  LHSHOT                                   $
PATCH   1        11      12
$
$DESVAR ID      NE      ME
DESVAR  1        3      4                                                CONT
CONT    4       20      36                                               CONT
CONT    2       18      34                                               CONT
CONT    15      31      47                                               CONT
CONT    13      29      45
$       IE1     IE2     IE3     IE4     IE5     IE6     IE7     IE8
PANLST2     11                1       2       3       4       13      14+CON
+CON          15      16      17      18      19      20      29      30+CON
+CON          31      32      33      34      35      36      45      46+CON
+CON          47      48
PANLST2     12                4       20      36       2      18      34+CON
+CON          15      31      47      13      29      45
$
$
PATCH   2        21      22
$
$DESVAR ID      NE      ME
DESVAR  2        3      4                                                CONT
CONT     5      21      37                                               CONT
CONT     7      23      39                                               CONT
CONT    10      26      42                                               CONT
CONT    12      28      44
$       IE1     IE2     IE3     IE4     IE5     IE6     IE7     IE8
PANLST2     21                5       6       7       8       9       10+CON
+CON          11      12      21      22      23      24      25      26+CON
+CON          27      28      37      38      39      40      41      42+CON
+CON          43      44
PANLST2     22                12      28      44      10      26      42+CON
+CON           7      23      39       5      21      37
$
$
PATCH   3        31      32
$
$DESVAR ID      NE      ME
DESVAR  3        3      4                                                CONT
CONT    61      189     269                                              CONT
CONT    63      191     271                                              CONT
CONT    50      178     258                                              CONT
CONT    52      180     260
PANLST2     31                49      50      51      52      61      62+CON
+CON          63      64      65      66      67      68      77      78+CON
```

```
+CON          79      80      81      82      83      84      93      94+CON
+CON          95      96      97      98      99     100     109     110+CON
+CON         111     112     113     114     115     116     125     126+CON
+CON         127     128     129     130     131     132     141     142+CON
+CON         143     144     145     146     147     148     157     158+CON
+CON         159     160     161     162     163     164     173     174+CON
+CON         175     176     177     178     179     180     189     190+CON
+CON         191     192     193     194     195     196     205     206+CON
+CON         207     208     209     210     211     212     221     222+CON
+CON         223     224     225     226     227     228     237     238+CON
+CON         239     240     241     242     243     244     253     254+CON
+CON         255     256     257     258     259     260     269     270+CON
+CON         271     272
PANLST2       32                      61       189       269        63       191       271CONT
CONT
CONT          50     178     258      52     180     260
$
$
PATCH   4        41      42
$
$DESVAR ID      NE      ME
DESVAR  4        3      4                                                  CONT
CONT    60      188     268                                                 CONT
CONT    58      186     266                                                 CONT
CONT    55      183     263                                                 CONT
CONT    53      181     261
PANLST2     41                53      54      55      56      57      58+CON
+CON          59      60      69      70      71      72      73      74+CON
+CON          75      76      85      86      87      88      89      90+CON
+CON          91      92     101     102     103     104     105     106+CON
+CON         107     108     117     118     119     120     121     122+CON
+CON         123     124     133     134     135     136     137     138+CON
+CON         139     140     149     150     151     152     153     154+CON
+CON         155     156     165     166     167     168     169     170+CON
+CON         171     172     181     182     183     184     185     186+CON
+CON         187     188     197     198     199     200     201     202+CON
+CON         203     204     213     214     215     216     217     218+CON
+CON         219     220     229     230     231     232     233     234+CON
+CON         235     236     245     246     247     248     249     250+CON
+CON         251     252     261     262     263     264     265     266+CON
+CON         267     268
PANLST2     42                53     181     261      55     183     263CONT
CONT          58     186     266      60     188     268
$
$TRJLST SETID
TRJLST  1                                                                  CONT
CONT    1       1.
$       TRAJCT  FACT    TRAJCT  FACT    TRAJCT  FACT    TRAJCT  FACT
$
$       TIME    MACH    ALTH    AOA     BETA    FORM    FILE1  FILE1
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
TRAJCT   1        1                                                         CONT
CONT    .00000E0 0.71871.45600E6  4.0000                                   CONT
CONT    .16000E2 0.98944.41990E6 14.0000                                   CONT
CONT    .33000E2 1.34826.43688E6  9.4208                                   CONT
CONT    .49000E2 1.63429.58196E6  3.6000                                   CONT
CONT    .68000E2 2.17754.82141E6  3.6000                                   CONT
CONT    .88000E2 2.99306.11358E7  3.6000                                   CONT
CONT    .10800E3 4.03065.14897E7  3.6000                                   CONT
CONT    .12800E3 5.30536.18668E7  3.6000                                   CONT
CONT    .14700E3 7.18387.22489E7  8.7000                                   CONT
CONT    .16500E3 8.14718.26307E7 10.2250                                   CONT
CONT    .18500E3 8.48577.29382E7 10.2250                                   CONT
CONT    .20500E3 8.73075.31108E7 10.2250                                   CONT
CONT    .22500E3 8.80061.31479E7 10.2250                                   CONT
CONT    .24500E3 8.62765.30495E7 10.2250                                   CONT
CONT    .26300E3 8.35804.28476E7 30.0000        TECPLOT CPTEMP1.PLT        CONT
CONT    .28300E3 7.92715.25083E7 30.0000                                   CONT
CONT    .30300E3 7.42020.20828E7 30.0000                                   CONT
CONT    .32300E3 6.98630.17006E7 30.0000                                   CONT
CONT    .34100E3 6.51451.15705E7 17.6576                                   CONT
```

```
CONT    .35900E3 6.29482.15555E7 11.3822                              CONT
CONT    .37900E3 6.12626.15505E7 11.5945                              CONT
CONT    .39900E3 5.96248.15405E7 11.6852                              CONT
CONT    .41900E3 5.80340.15256E7 11.6316                              CONT
CONT    .43900E3 5.64886.15063E7 11.4712                              CONT
CONT    .45900E3 5.49856.14827E7 11.2120                              CONT
CONT    .47900E3 5.35216.14551E7 10.8676                              CONT
CONT    .49900E3 5.20938.14237E7 10.4565                              CONT
CONT    .51900E3 5.06993.13890E7  9.9883                              CONT
CONT    .53900E3 4.92935.13511E7  9.3991                              CONT
CONT    .55900E3 4.78106.13103E7  8.7931                              CONT
CONT    .57900E3 4.62119.12670E7  8.2187                              CONT
CONT    .59900E3 4.44764.12216E7  7.6847                              CONT
CONT    .61900E3 4.25902.11747E7  7.2020                              CONT
CONT    .63900E3 4.05448.11267E7  6.7771                              CONT
CONT    .65900E3 3.82413.10782E7  6.3472                              CONT
CONT    .67900E3 3.56631.10300E7  5.9874                              CONT
CONT    .69900E3 3.28723.98254E6  5.7202                              CONT
CONT    .71759E3 3.00000.93312E6  4.8191        TECPLOT CPTEMP2.PLT   CONT
CONT    .73600E3 2.68846.87329E6  4.1829                              CONT
CONT    .75600E3 2.29065.80146E6  3.4982                              CONT
CONT    .77600E3 1.86649.72891E6  3.0646                              CONT
CONT    .79600E3 1.47000.66074E6  3.0928                              CONT
CONT    .81600E3 1.14676.59940E6  3.3054                              CONT
CONT    .83600E3 0.96665.54315E6  3.8323                              CONT
CONT    .85600E3 0.86983.48792E6  3.8046                              CONT
CONT    .87400E3 0.80178.43914E6  3.9110                              CONT
CONT    .89400E3 0.73186.38870E6  3.9359                              CONT
CONT    .91400E3 0.67432.34157E6  3.9549                              CONT
CONT    .93400E3 0.62713.29712E6  3.9492                              CONT
CONT    .95400E3 0.58784.25488E6  3.9046                              CONT
CONT    .97400E3 0.55190.21464E6  3.8498                              CONT
CONT    .99400E3 0.51899.17633E6  3.8233                              CONT
CONT    .10140E4 0.48941.13984E6  3.8101                              CONT
CONT    .10340E4 0.46307.10502E6  3.8009                              CONT
CONT    .10540E4 0.43975.71741E5  3.7895                              CONT
CONT    .10740E4 0.41915.39891E5  3.7718                              CONT
CONT    .10940E4 0.40098.93915E4  3.7458
$         TIME     MACH    ALTH    AOA     BETA    P       Q       R
$
$THERMPR|SETID  |TEMP   |HOTWALL|TRANS  |GAS    |EMMS   |       |       |
THERMPR 1        100F
ENDDATA
```

Listing 3.2 Control Table File: CFDTABLE.DAT

```
       CONE
ZNRGEO.DAT
       REFC        REFB        REFS        REFX        REFY        REFZ  NO AESURFZ LENGTH UNIT   MASS UNIT
  2.0622E+01  1.0000E+00  1.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00           0          IN         SLIN
       MACH           H       ALPHA        BETA       PRATE       QRATE       RRATE          CD          CY          CL          CR          CM          CN        FILE
  2.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  7.1677E+01  3.9853E-07  3.1696E-05 -9.1579E-07 -2.4108E-05  1.3317E-05FLAOW0001
  4.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  5.8882E+01  1.6087E-07  2.6786E-05 -2.1905E-06 -1.8734E-05  7.3458E-06FLAOW0002
  7.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  5.5485E+01  2.4641E-07  3.5422E-05 -8.2970E-07 -2.7614E-05  8.9297E-06FLAOW0003
  1.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  5.4679E+01  1.8156E-07  2.2260E-05 -4.3105E-07 -1.6718E-05  6.8477E-06FLAOW0004
  1.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  5.4266E+01  2.7226E-07  3.9372E-05 -2.1199E-06 -2.8657E-05  8.6641E-06FLAOW0005
  2.0000E+00  0.0000E+00  4.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  7.3222E+01 -4.3014E-04  1.9863E+01  5.5029E-05 -1.8285E+01  7.8704E-04FLAOW0006
  4.0000E+00  0.0000E+00  4.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  6.0976E+01  2.6790E-04  2.1524E+01 -3.7475E-05 -1.9172E+01 -4.5588E-04FLAOW0007
  7.0000E+00  0.0000E+00  4.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  5.7720E+01 -6.6446E-05  2.2540E+01  7.7301E-06 -1.9764E+01  1.1624E-04FLAOW0008
  1.0000E+01  0.0000E+00  4.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  5.7147E+01 -4.3300E-04  2.2973E+01  2.6737E-05 -2.0024E+01  4.1108E-04FLAOW0009
  1.5000E+01  0.0000E+00  4.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  5.7799E+01 -4.8966E-04  2.3569E+01  3.3456E-05 -2.0469E+01  5.0995E-04FLAOW0010
  2.0000E+00  0.0000E+00  7.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  7.6404E+01  2.3285E-04  3.4549E+01 -6.3325E-05 -3.1974E+01 -5.1033E-04FLAOW0011
  4.0000E+00  0.0000E+00  7.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  6.5239E+01  2.1879E-04  3.6948E+01 -5.9407E-05 -3.3258E+01 -4.8382E-04FLAOW0012
  7.0000E+00  0.0000E+00  7.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  6.2002E+01 -2.4108E-04  3.8384E+01  2.6890E-05 -3.4135E+01  2.3908E-04FLAOW0013
  1.0000E+01  0.0000E+00  7.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  6.1167E+01 -2.9374E-04  3.9052E+01  3.1322E-05 -3.4588E+01  2.7106E-04FLAOW0014
  1.5000E+01  0.0000E+00  7.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  6.1141E+01 -3.6500E-04  3.9791E+01  2.9149E-05 -3.5157E+01  2.6401E-04FLAOW0015
  2.0000E+00  0.0000E+00  1.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  8.1282E+01 -1.0924E-04  4.8868E+01  2.0896E-05 -4.5606E+01  1.2791E-04FLAOW0016
  4.0000E+00  0.0000E+00  1.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  7.1680E+01 -3.1771E-04  5.1337E+01  8.3453E-05 -4.6961E+01  4.8063E-04FLAOW0017
  7.0000E+00  0.0000E+00  1.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  6.8719E+01  2.6707E-04  5.2649E+01 -6.3493E-05 -4.7776E+01 -3.6004E-04FLAOW0018
  1.0000E+01  0.0000E+00  1.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  6.7885E+01  2.2880E-04  5.3307E+01 -3.6633E-05 -4.8256E+01 -2.0473E-04FLAOW0019
  1.5000E+01  0.0000E+00  1.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  6.7707E+01 -2.8531E-04  5.4023E+01  1.1445E-04 -4.8839E+01  6.6047E-04FLAOW0020
  2.0000E+00  0.0000E+00  1.3000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  8.7812E+01 -1.2895E-03  6.2646E+01  5.2425E-04 -5.9136E+01  2.2920E-03FLAOW0021
  4.0000E+00  0.0000E+00  1.3000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  8.0102E+01 -3.5613E-04  6.4439E+01  1.0833E-04 -6.0226E+01  4.8715E-04FLAOW0022
  7.0000E+00  0.0000E+00  1.3000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  7.7542E+01 -6.0890E-04  6.5009E+01  2.7973E-04 -6.0535E+01  1.2213E-03FLAOW0023
  1.0000E+01  0.0000E+00  1.3000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  7.6800E+01  4.4272E-04  6.5326E+01 -1.4424E-04 -6.0775E+01 -6.0727E-04FLAOW0024
  1.5000E+01  0.0000E+00  1.3000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  7.6631E+01  3.5711E-04  6.5773E+01 -1.4772E-04 -6.1164E+01 -6.3042E-04FLAOW0025
  2.0000E+00  0.0000E+00  1.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  9.3036E+01 -2.2305E-03  7.1416E+01  1.0773E-03 -6.8055E+01  4.0279E-03FLAOW0026
  4.0000E+00  0.0000E+00  1.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  8.6735E+01 -7.8530E-04  7.2353E+01  3.3803E-04 -6.8808E+01  1.2685E-03FLAOW0027
  7.0000E+00  0.0000E+00  1.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  8.4431E+01  3.2635E-03  7.2161E+01 -1.6706E-03 -6.8581E+01 -6.2162E-03FLAOW0028
  1.0000E+01  0.0000E+00  1.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  8.3764E+01 -2.0867E-03  7.2124E+01  1.0059E-03 -6.8561E+01  3.7604E-03FLAOW0029
  1.5000E+01  0.0000E+00  1.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  8.3477E+01 -1.5872E-04  7.2212E+01 -3.6095E-05 -6.8654E+01 -1.1170E-04FLAOW0030
  2.0000E+00  0.0000E+00  2.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0884E+02 -4.0801E-04  9.1305E+01  1.9956E-04 -8.9691E+01  5.6837E-04FLAOW0031
  4.0000E+00  0.0000E+00  2.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0638E+02 -8.9973E-04  8.8846E+01  5.0849E-04 -8.9245E+01  1.4034E-03FLAOW0032
  7.0000E+00  0.0000E+00  2.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0461E+02 -1.0961E-04  8.6269E+01  1.1938E-05 -8.7360E+01  5.0313E-05FLAOW0033
  1.0000E+01  0.0000E+00  2.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0410E+02  9.7958E-05  8.5395E+01 -8.8668E-05 -8.6722E+01 -2.4330E-04FLAOW0034
  1.5000E+01  0.0000E+00  2.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0443E+02 -2.4118E-06  8.5366E+01 -1.1152E-04 -8.6845E+01 -3.0098E-04FLAOW0035
  2.0000E+00  0.0000E+00  2.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2776E+02  2.0604E-03  1.0707E+02 -1.7755E-03 -1.0961E+02 -3.7955E-03FLAOW0036
  4.0000E+00  0.0000E+00  2.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2932E+02  6.1739E-04  9.9954E+01 -5.0425E-04 -1.0793E+02 -1.0753E-03FLAOW0037
  7.0000E+00  0.0000E+00  2.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2777E+02 -1.8576E-05  9.5041E+01  4.8327E-05 -1.0450E+02  1.1309E-04FLAOW0038
  1.0000E+01  0.0000E+00  2.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2726E+02  2.3855E-03  9.3471E+01 -1.9418E-03 -1.0337E+02 -4.1621E-03FLAOW0039
  1.5000E+01  0.0000E+00  2.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2762E+02  2.3000E-03  9.3019E+01 -1.9694E-03 -1.0322E+02 -4.2215E-03FLAOW0040
  2.0000E+00  0.0000E+00  3.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.4851E+02 -1.2938E-03  1.1770E+02  1.0475E-03 -1.2726E+02  1.8245E-03FLAOW0041
  4.0000E+00  0.0000E+00  3.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.5393E+02 -9.5688E-04  1.0501E+02  6.4775E-04 -1.2441E+02  1.1191E-03FLAOW0042
  7.0000E+00  0.0000E+00  3.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.5241E+02  5.0372E-03  9.8415E+01 -5.0817E-03 -1.2004E+02 -8.7954E-03FLAOW0043
  1.0000E+01  0.0000E+00  3.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.5188E+02 -4.4268E-05  9.6408E+01 -7.2857E-05 -1.1864E+02 -1.1447E-04FLAOW0044
  1.5000E+01  0.0000E+00  3.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.5222E+02  4.5101E-04  9.5677E+01 -5.4858E-04 -1.1834E+02 -9.4642E-04FLAOW0045
  2.0000E+00  0.0000E+00  3.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.7011E+02 -9.0670E-03  1.2285E+02  7.9142E-03 -1.4272E+02  1.1323E-02FLAOW0046
  4.0000E+00  0.0000E+00  3.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.7809E+02 -6.6063E-03  1.0393E+02  6.9317E-03 -1.3811E+02  9.9071E-03FLAOW0047
  7.0000E+00  0.0000E+00  3.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.7674E+02  2.6866E-03  9.6487E+01 -3.1053E-03 -1.3365E+02 -4.4254E-03FLAOW0048
  1.0000E+01  0.0000E+00  3.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.7619E+02 -3.9039E-05  9.4280E+01 -1.1365E-04 -1.3220E+02 -1.5207E-04FLAOW0049
  1.5000E+01  0.0000E+00  3.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.7653E+02 -8.6800E-04  9.3394E+01  8.0016E-04 -1.3187E+02  1.1533E-03FLAOW0050
  2.0000E+00  0.0000E+00  4.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.9176E+02 -3.1741E-03  1.2154E+02  3.7146E-03 -1.5556E+02  4.4334E-03FLAOW0051
  4.0000E+00  0.0000E+00  4.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.9996E+02  9.2090E-03  9.7095E+01 -1.1874E-02 -1.4870E+02 -1.4146E-02FLAOW0052
  7.0000E+00  0.0000E+00  4.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.9899E+02  5.6242E-03  8.9354E+01 -7.1697E-03 -1.4465E+02 -8.5316E-03FLAOW0053
  1.0000E+01  0.0000E+00  4.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.9847E+02  2.1020E-03  8.7141E+01 -2.7835E-03 -1.4334E+02 -3.3107E-03FLAOW0054
  1.5000E+01   0.0000E+00   4.0000E+01   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00   1.9885E+02   2.2446E-03   8.6237E+01  -2.9686E-03  -1.4308E+02  -3.5285E-03FLAOW0055
```

Listing 3.3 ZONAIR Solution File: FLAOWi

```
(Only shows the file:FLOW0001)
      8     272       2       1UVWCP   1P,5E16.9
      1       1     272
 1.287919283E-02 1.289385557E-02 1.289397478E-02 1.287907362E-02 1.287907362E-02
 1.289397478E-02 1.289385557E-02 1.287919283E-02 1.287919283E-02 1.289385557E-02
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2.922536135E-01 2.938427925E-01

* *Output Data Listing*

Listing 3.4 Standard Output File: CONE_TPS.OUT

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             ****       **       **         ******
             ****      **       **        *****
              ***      **      **       *****                *
              ***      **     **       ****            *********
      *       ***      *     **     ****          ****************
    ***        ***     *    **   ****       **************
    *****      ***     *   **   ***  ***********
    ******      **    *   **  **     ********
     ******     **    *  **                ********************
       *****     **   ***       ZONA          ***  *******************
 *      *****    **   *    THERMAL PROTECTION  **        ************
 **       ****    *  *   SYSTEM DESIGN SOFTWARE  *****            ****
 ****      ****   ***                             *******
*******     ****   *                               *********
*********     ***  *          -  TPSOPT -          ***  *******
   *********   *****                               ***    *********
      ********   ***          VERSION 3.1E         *****    **********
*         ******  **                               ******     *********
 ****       ********   RELEASE DATE: DEC 2004    *********     *******
 *********       *****                           ***********      ****
 ***************   ****   LICENSE NO.           *****  ******       *
  **********************                       ******   ******
              ************                   ********   ********
                      *******            *************   *********
    ********************************************* ******  **********
     ********************   *******************   ******   ********
      *************       ***************  ****   *******   *****
       *******        *********** ******  *****   *******   ****
        *         ************  *******  ******   ********   *
               **************  ********  *******  ********
             **************   ********   ******   ********
                ********    *********   *******   *****
                  ****   **********   ********    ***
                    *  ***********   *********
                           ******    *******
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                    E X E C U T I V E   C O N T R O L   S U M M A R Y

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               ASSIGN AEROBASE='CFDTABLE.DAT',PRINT=0
               SOL 1
               CEND

                         C A S E   C O N T R O L   S U M M A R Y

                    S I N G L E   P R E C I S I O N   C O M P U T A T I O N

                M A X I M U M   A L L O C A B L E   M E M O R Y  = 800  M E G A B Y T E S

               |...1...|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|..10...|


               ECHO = SORT
               SUBCASE = 1
               SUBTITLE=BLENT-NOSE  CONE WITH 20 DEG NOSE ANGLE
               LABEL= HYPERSONIC AERODYNAMIC DATABASE BY ZONAIR
               TPSDES=1
               BEGIN BULK

                         S O R T E D   B U L K   D A T A   E C H O
CARD
COUNT          |...1...|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|..10...|


    1 -        DESVAR  1       3       4                                               CONT
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```
 2 -       CONT    4       20      36                                                      CONT
 3 -       CONT    2       18      34                                                      CONT
 4 -       CONT    15      31      47                                                      CONT
 5 -       CONT    13      29      45
 6 -       DESVAR  2       3       4                                                       CONT
 7 -       CONT    5       21      37                                                      CONT
 8 -       CONT    7       23      39                                                      CONT
 9 -       CONT    10      26      42                                                      CONT
10 -       CONT    12      28      44
11 -       DESVAR  3       3       4                                                       CONT
12 -       CONT    61      189     269                                                     CONT
13 -       CONT    63      191     271                                                     CONT
14 -       CONT    50      178     258                                                     CONT
15 -       CONT    52      180     260
16 -       DESVAR  4       3       4                                                       CONT
17 -       CONT    60      188     268                                                     CONT
18 -       CONT    58      186     266                                                     CONT
19 -       CONT    55      183     263                                                     CONT
20 -       CONT    53      181     261
21 -       PANLST2 11              1       2       3       4       13      14      +CON
22 -       +CON    15      16      17      18      19      20      29      30      +CON
23 -       +CON    31      32      33      34      35      36      45      46      +CON
24 -       +CON    47      48
25 -       PANLST2 12              4       20      36      2       18      34      +CON
26 -       +CON    15      31      47      13      29      45
27 -       PANLST2 21              5       6       7       8       9       10      +CON
28 -       +CON    11      12      21      22      23      24      25      26      +CON
29 -       +CON    27      28      37      38      39      40      41      42      +CON
30 -       +CON    43      44
31 -       PANLST2 22              12      28      44      10      26      42      +CON
32 -       +CON    7       23      39      5       21      37
33 -       PANLST2 31              49      50      51      52      61      62      +CON
34 -       +CON    63      64      65      66      67      68      77      78      +CON
35 -       +CON    79      80      81      82      83      84      93      94      +CON
36 -       +CON    95      96      97      98      99      100     109     110     +CON
37 -       +CON    111     112     113     114     115     116     125     126     +CON
38 -       +CON    127     128     129     130     131     132     141     142     +CON
39 -       +CON    143     144     145     146     147     148     157     158     +CON
40 -       +CON    159     160     161     162     163     164     173     174     +CON
41 -       +CON    175     176     177     178     179     180     189     190     +CON
42 -       +CON    191     192     193     194     195     196     205     206     +CON
43 -       +CON    207     208     209     210     211     212     221     222     +CON
44 -       +CON    223     224     225     226     227     228     237     238     +CON
45 -       +CON    239     240     241     242     243     244     253     254     +CON
46 -       +CON    255     256     257     258     259     260     269     270     +CON
47 -       +CON    271     272
48 -       PANLST2 32              61      189     269     63      191     271     CONT
49 -       CONT    50      178     258     52      180     260
50 -       PANLST2 41              53      54      55      56      57      58      +CON
51 -       +CON    59      60      69      70      71      72      73      74      +CON
52 -       +CON    75      76      85      86      87      88      89      90      +CON
53 -       +CON    91      92      101     102     103     104     105     106     +CON
54 -       +CON    107     108     117     118     119     120     121     122     +CON
55 -       +CON    123     124     133     134     135     136     137     138     +CON
56 -       +CON    139     140     149     150     151     152     153     154     +CON
57 -       +CON    155     156     165     166     167     168     169     170     +CON
58 -       +CON    171     172     181     182     183     184     185     186     +CON
59 -       +CON    187     188     197     198     199     200     201     202     +CON
60 -       +CON    203     204     213     214     215     216     217     218     +CON
61 -       +CON    219     220     229     230     231     232     233     234     +CON
62 -       +CON    235     236     245     246     247     248     249     250     +CON
63 -       +CON    251     252     261     262     263     264     265     266     +CON
64 -       +CON    267     268
65 -       PANLST2 42              53      181     261     55      183     263     CONT
66 -       CONT    58      186     266     60      188     268
67 -       PATCH   1       11      12
68 -       PATCH   2       21      22
69 -       PATCH   3       31      32
70 -       PATCH   4       41      42
71 -       PLTAERO 1       YES     NO              NASTRAN AEROMESH.NAS
72 -       PLTTPS  -1      1       ALL     TECPLOT CONE1L. PLT     -1.0
73 -       PLTTPS  2       1       ALL     TECPLOT CONEML. PLT     0.05
74 -       PRVAL   4               30000000
75 -       PODRSM  1       1                               SAVE    CONEM1. RST     CONT
76 -       CONT    CPPODRSM.P3D    UPODRSM.P3D     VPODRSM .P3D    WPODRSM .P3D
77 -       STTYPE  1       1       508                                                     CONT
78 -       CONT    0.01
79 -       STTYPE  2       1       501                                                     CONT
80 -       CONT    1.0
81 -       STTYPE  3       6       245                                                     CONT
82 -       CONT    0.01
83 -       STTYPE  4       1       313                                                     CONT
84 -       CONT    0.05
85 -       STTYPE  5       6       245                                                     CONT
86 -       CONT    0.01
87 -       STTYPE  6       1       103                                                     CONT
88 -       CONT    0.1
89 -       STTYPE  31      6       221                                                     CONT
90 -       CONT    0.05
91 -       STTYPE  32      1       266                                                     CONT
92 -       CONT    0.05
93 -       STTYPE  33      1       260                                                     CONT
94 -       CONT    1.2
95 -       STTYPE  34      1       266                                                     CONT
96 -       CONT    0.2
```

```
 97 -       STTYPE  35      6       245                                             CONT
 98 -       CONT    0.3
 99 -       STTYPE  36      1       103                                             CONT
100 -       CONT    0.2
101 -       THERMPR 1       100F
102 -       TPSDES  1       1       1       1                                       CONT
103 -       CONT    1       2       3       4
104 -       TPSSYM  1       1       6       4                                       CONT
105 -       CONT    1       1       0.008   0.05                                    CONT
106 -       CONT    1       2       0.5     4.0                                     CONT
107 -       CONT    1       3       0.01    0.1                                     CONT
108 -       CONT    1       4       0.015   0.2                                     CONT
109 -       CONT    1       5       0.01    0.1                                     CONT
110 -       CONT    0       6       0.02    0.2
111 -       TPSSYM  2       2       6       4                                       CONT
112 -       CONT    2       1       0.008   0.05                                    CONT
113 -       CONT    2       2       0.5     4.0                                     CONT
114 -       CONT    2       3       0.01    0.1                                     CONT
115 -       CONT    2       4       0.015   0.2                                     CONT
116 -       CONT    2       5       0.01    0.1                                     CONT
117 -       CONT    0       6       0.02    0.2
118 -       TPSSYM  3       3       6       4                                       CONT
119 -       CONT    3       1       0.008   0.05                                    CONT
120 -       CONT    3       2       0.5     4.0                                     CONT
121 -       CONT    3       3       0.01    0.1                                     CONT
122 -       CONT    3       4       0.015   0.2                                     CONT
123 -       CONT    3       5       0.01    0.1                                     CONT
124 -       CONT    0       6       0.02    0.2
125 -       TPSSYM  4       4       6       4                                       CONT
126 -       CONT    4       31      0.003   0.1                                     CONT
127 -       CONT    4       32      0.004   0.1                                     CONT
128 -       CONT    4       33      0.2     5.0                                     CONT
129 -       CONT    4       34      0.015   1.0                                     CONT
130 -       CONT    4       35      0.005   0.8                                     CONT
131 -       CONT    0       36      0.01    1.0
132 -       TRAJCT  1       1                                                       CONT
133 -       CONT    .00000E00.71871 .45600E64.0000                                  CONT
134 -       CONT    .16000E20.98944 .41990E614.0000                                 CONT
135 -       CONT    .33000E21.34826 .43688E69.4208                                  CONT
136 -       CONT    .49000E21.63429 .58196E63.6000                                  CONT
137 -       CONT    .68000E22.17754 .82141E63.6000                                  CONT
138 -       CONT    .88000E22.99306 .11358E73.6000                                  CONT
139 -       CONT    .10800E34.03065 .14897E73.6000                                  CONT
140 -       CONT    .12800E35.30536 .18668E73.6000                                  CONT
141 -       CONT    .14700E37.18387 .22489E78.7000                                  CONT
142 -       CONT    .16500E38.14718 .26307E710.2250                                 CONT
143 -       CONT    .18500E38.48577 .29382E710.2250                                 CONT
144 -       CONT    .20500E38.73075 .31108E710.2250                                 CONT
145 -       CONT    .22500E38.80061 .31479E710.2250                                 CONT
146 -       CONT    .24500E38.62765 .30495E710.2250                                 CONT
147 -       CONT    .26300E38.35804 .28476E730.0000         TECPLOT CPTEMP1.PLT     CONT
148 -       CONT    .28300E37.92715 .25083E730.0000                                 CONT
149 -       CONT    .30300E37.42020 .20828E730.0000                                 CONT
150 -       CONT    .32300E36.98630 .17006E730.0000                                 CONT
151 -       CONT    .34100E36.51451 .15705E717.6576                                 CONT
152 -       CONT    .35900E36.29482 .15555E711.3822                                 CONT
153 -       CONT    .37900E36.12626 .15505E711.5945                                 CONT
154 -       CONT    .39900E35.96248 .15405E711.6852                                 CONT
155 -       CONT    .41900E35.80340 .15256E711.6316                                 CONT
156 -       CONT    .43900E35.64886 .15063E711.4712                                 CONT
157 -       CONT    .45900E35.49856 .14827E711.2120                                 CONT
158 -       CONT    .47900E35.35216 .14551E710.8676                                 CONT
159 -       CONT    .49900E35.20938 .14237E710.4565                                 CONT
160 -       CONT    .51900E35.06993 .13890E79.9883                                  CONT
161 -       CONT    .53900E34.92935 .13511E79.3991                                  CONT
162 -       CONT    .55900E34.78106 .13103E78.7931                                  CONT
163 -       CONT    .57900E34.62119 .12670E78.2187                                  CONT
164 -       CONT    .59900E34.44764 .12216E77.6847                                  CONT
165 -       CONT    .61900E34.25902 .11747E77.2020                                  CONT
166 -       CONT    .63900E34.05448 .11267E76.7771                                  CONT
167 -       CONT    .65900E33.82413 .10782E76.3472                                  CONT
168 -       CONT    .67900E33.56631 .10300E75.9874                                  CONT
169 -       CONT    .69900E33.28723 .98254E65.7202                                  CONT
170 -       CONT    .71759E33.00000 .93312E64.8191         TECPLOT CPTEMP2.PLT     CONT
171 -       CONT    .73600E32.68846 .87329E64.1829                                  CONT
172 -       CONT    .75600E32.29065 .80146E63.4982                                  CONT
173 -       CONT    .77600E31.86649 .72891E63.0646                                  CONT
174 -       CONT    .79600E31.47000 .66074E63.0928                                  CONT
175 -       CONT    .81600E31.14676 .59940E63.3054                                  CONT
176 -       CONT    .83600E30.96665 .54315E63.8323                                  CONT
177 -       CONT    .85600E30.86983 .48792E63.8046                                  CONT
178 -       CONT    .87400E30.80178 .43914E63.9110                                  CONT
179 -       CONT    .89400E30.73186 .38870E63.9359                                  CONT
180 -       CONT    .91400E30.67432 .34157E63.9549                                  CONT
181 -       CONT    .93400E30.62713 .29712E63.9492                                  CONT
182 -       CONT    .95400E30.58784 .25488E63.9046                                  CONT
183 -       CONT    .97400E30.55190 .21464E63.8498                                  CONT
184 -       CONT    .99400E30.51899 .17633E63.8233                                  CONT
185 -       CONT    .10140E40.48941 .13984E63.8101                                  CONT
186 -       CONT    .10340E40.46307 .10502E63.8009                                  CONT
187 -       CONT    .10540E40.43975 .71741E53.7895                                  CONT
188 -       CONT    .10740E40.41915 .39891E53.7718                                  CONT
189 -       CONT    .10940E40.40098 .93915E43.7458
190 -       TRJLST  1                                                               CONT
191 -       CONT    1       1.
```

```
                    192 -       ENDDATA


                                  ****************************************
                                  *                                      *
                                  *       SUBCASE       =        1       *
                                  *       DISCIPLINE    = TPSDES         *
                                  *       BULK ENTRY ID =        1       *
                                  *                                      *
                                  ****************************************


                 OPTIMIZATION SYSTEM FOR TPSSYM =     1


 TOTAL NUMBER OF DESIGN VARIABLES =   60
 TOTAL NUMBER OF CONSTRAINS       = 1704
 TOTAL NUMBER OF TEMP. CONSTRAINS = 1584
 TOTAL NUMBER OF TEMP. PRINTOUTS  =   22


MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
    X   0.2188E+04
   1.0 B     B
       |          B     B
       |                B     B
       |                      B     B     B
       |                            B
       |                                  B     B
       |                                        A     B    B     B
       |                                                          B    B    B
       F     F    F     F     F     D    D     D     D    D     D    D          A     A     A    A          B     B
       |                            F    F     F     F    F     F    F     F    F     D     D    D     A    A     A    B
   0.0 +-----------+-----------+-----------+-----------+-----------+-----------+-------F---+-F----F----+F-----F----+F----F-----+
       |
       |
       |
       |
       |
       |
       |
       |
       |
  -1.0 +
       .05         .15         .25         .35         .45         .55         .65         .75         .85         .95       1.05
                                                              TIME  ( X 2.803E-44 )


              MAXIMUM TEMPERATURE OF EVERY LAYER
LAYER:         1         2         3         4         5         6
Tmax:    2300.33   2400.33    550.33    450.33    550.33    350.33
Optv:    2187.64   2183.67    448.35    448.35    349.07    349.07

                   VALUES OF DESIGN VARIABLES :
LAYER     DEV01     DEV02     DEV03     DEV04     DEV05     DEV06     DEV07     DEV08     DEV09     DEV10     DEV11     DEV12
    1   0.00826   0.00827   0.00800   0.00900   0.00808   0.00808   0.00900   0.00808   0.00810   0.00826   0.00827   0.00800
    2   1.09182   1.07761   0.92326   1.24383   1.11360   1.05243   1.24383   1.11386   1.05286   1.09181   1.07764   0.92323
    3   0.01579   0.01579   0.02410   0.01125   0.01010   0.01010   0.01125   0.01010   0.01012   0.01580   0.01579   0.02410
    4   0.12181   0.10537   0.05006   0.19538   0.12863   0.12622   0.19538   0.12865   0.12568   0.12181   0.10539   0.05006
    5   0.01604   0.01606   0.02512   0.01125   0.01010   0.01010   0.01125   0.01010   0.01012   0.01605   0.01606   0.02512

 THE ORIGINAL OBJECTIVE FUNCTION =      24.1400013

 THE RATIO OF OPTIMAL OBJECTIVE FUNCTION =   1.1389003

 THE TOTAL OPTIMAL WEIGHT = 3.30052600E+01

              OPTIMAL STRUCTURES OF TPS FOR PATCH =       1
                    (WITH AVERAGE THICKNESS)
 ========================================================   -----
                                                             i
                      RCG COATING          slab              0.00828 in.  2187.6 F
                                                             i
 ========================================================   -----
                                                             i
                      LI900                slab              1.08382 in.  2183.7 F
                                                             i
 ========================================================   -----
                      RTV-560              thin skin         0.01452 in.   448.4 F
 ========================================================   -----
                                                             i
                      5.4 LB SIP           slab              0.12120 in.   448.4 F
                                                             i
 ========================================================   -----
                      RTV-560              thin skin         0.01478 in.   349.1 F
 ========================================================   -----
                                                             i
                      ALUMINUM 7075-T6     slab              0.10000 in.   349.1 F
                                                             i
 ========================================================   -----
```

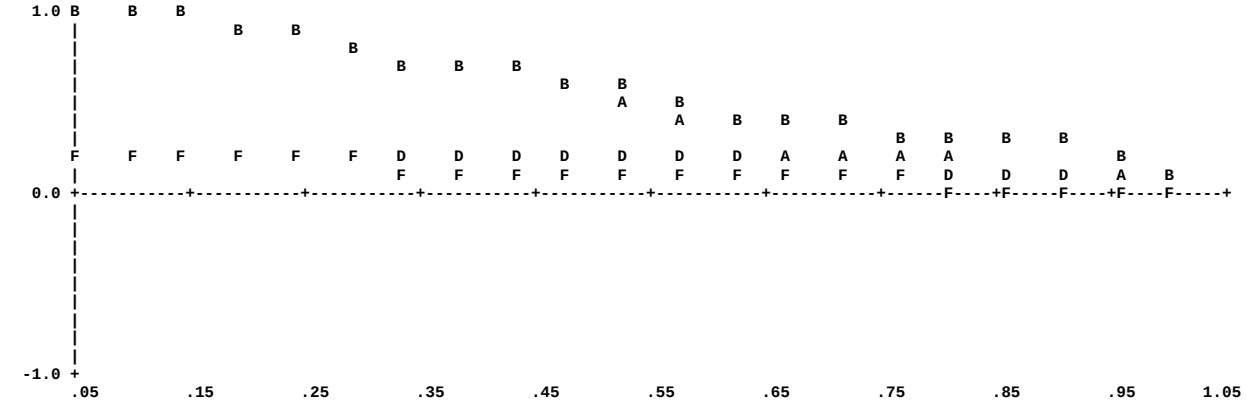
THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH = 1

PANEL	LAYER01		LAYER02		LAYER03		LAYER04		LAYER05		LAYER06	
1	0.00892	2168.46	1.24379	2166.31	0.01014	550.33	0.19382	448.35	0.01010	370.46	0.10000	290.34
2	0.00900	2150.24	1.24383	2145.96	0.01125	448.01	0.19538	448.01	0.01125	285.87	0.10000	285.87
3	0.00865	2136.70	1.17686	2134.67	0.01293	550.33	0.16194	443.28	0.01303	376.75	0.10000	310.22
4	0.00826	2111.13	1.09182	2107.36	0.01579	437.18	0.12181	437.18	0.01604	338.29	0.10000	338.29
13	0.00826	2079.82	1.09181	2076.09	0.01580	417.65	0.12181	417.65	0.01605	338.70	0.10000	338.70
14	0.00865	2136.70	1.17688	2134.67	0.01293	550.33	0.16195	443.29	0.01303	376.75	0.10000	310.21
15	0.00900	2187.64	1.24383	2183.67	0.01125	448.07	0.19538	448.07	0.01125	345.87	0.10000	345.87
16	0.00892	2168.46	1.24381	2166.31	0.01014	550.33	0.19383	448.35	0.01010	370.46	0.10000	290.33
17	0.00800	2187.64	1.09823	2185.66	0.00870	550.33	0.12435	448.35	0.00863	397.26	0.10000	349.07
18	0.00808	2164.79	1.11360	2160.84	0.01010	448.35	0.12863	448.35	0.01010	346.18	0.10000	346.18
19	0.00812	2143.23	1.08988	2141.30	0.01244	550.33	0.11535	434.72	0.01256	390.17	0.10000	345.62
20	0.00827	1969.39	1.07761	1965.99	0.01579	369.38	0.10537	369.38	0.01606	349.07	0.10000	349.07
29	0.00827	2079.82	1.07764	2077.96	0.01579	550.33	0.10539	417.65	0.01606	378.17	0.10000	338.70
30	0.00812	2143.24	1.09018	2141.31	0.01244	550.33	0.11536	434.70	0.01256	390.16	0.10000	345.62
31	0.00808	2187.64	1.11386	2185.66	0.01010	550.33	0.12865	448.07	0.01010	396.97	0.10000	345.87
32	0.00800	2187.64	1.09834	2185.66	0.00870	550.33	0.12434	448.35	0.00863	397.26	0.10000	349.07
33	0.00810	2187.64	1.07756	2185.66	0.00800	550.33	0.14072	448.35	0.00800	397.26	0.10000	345.63
34	0.00808	2164.79	1.05243	2162.82	0.01010	550.33	0.12622	448.35	0.01010	397.26	0.10000	346.18
35	0.00804	2087.00	1.00092	2085.13	0.01567	550.33	0.09601	417.07	0.01608	382.20	0.10000	347.32
36	0.00800	1969.39	0.92326	1967.69	0.02410	550.33	0.05006	369.38	0.02512	359.23	0.10000	349.07
45	0.00800	1969.52	0.92323	1967.82	0.02410	550.33	0.05006	369.38	0.02512	359.23	0.10000	349.07
46	0.00806	2087.16	1.00135	2085.29	0.01569	550.33	0.09547	416.33	0.01610	381.84	0.10000	347.35
47	0.00810	2164.91	1.05286	2162.93	0.01012	550.33	0.12568	447.62	0.01012	396.91	0.10000	346.21
48	0.00811	2187.64	1.07773	2185.66	0.00800	550.33	0.14051	448.35	0.00800	397.26	0.10000	345.64

OPTIMIZATION SYSTEM FOR TPSSYM = 2

TOTAL NUMBER OF DESIGN VARIABLES = 60
TOTAL NUMBER OF CONSTRAINS = 1704
TOTAL NUMBER OF TEMP. CONSTRAINS = 1584
TOTAL NUMBER OF TEMP. PRINTOUTS = 22

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



MAXIMUM TEMPERATURE OF EVERY LAYER

LAYER:	1	2	3	4	5	6
Tmax:	2300.33	2400.33	550.33	450.33	550.33	350.33
Optv:	2085.86	2082.24	450.29	450.29	349.96	349.96

VALUES OF DESIGN VARIABLES :

LAYER	DEV01	DEV02	DEV03	DEV04	DEV05	DEV06	DEV07	DEV08	DEV09	DEV10	DEV11	DEV12
1	0.00809	0.00908	0.00808	0.00906	0.00800	0.00800	0.00906	0.00800	0.00808	0.00809	0.00908	0.00808
2	1.07279	1.17915	0.90940	1.20439	0.96897	0.80846	1.20426	0.96894	0.81500	1.07271	1.17920	0.90939
3	0.01341	0.01135	0.01010	0.01267	0.02282	0.01000	0.01276	0.02284	0.01010	0.01342	0.01135	0.01010
4	0.12521	0.19584	0.11594	0.19553	0.05276	0.11018	0.19552	0.05272	0.10675	0.12518	0.19584	0.11594
5	0.01356	0.01135	0.01010	0.01274	0.02410	0.01000	0.01283	0.02410	0.01010	0.01357	0.01135	0.01010

THE ORIGINAL OBJECTIVE FUNCTION = 24.1400013

THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 1.0873410

THE TOTAL OPTIMAL WEIGHT = 3.15091709E+01

OPTIMAL STRUCTURES OF TPS FOR PATCH = 2
(WITH AVERAGE THICKNESS)

RCG COATING	slab	0.00839 in.	2085.9 F i
LI900	slab	1.02439 in.	2082.2 F i

```
                                                                    i
============================================================     -----
                     RTV-560             thin skin               0.01341 in.   450.3 F
============================================================     -----
                                                                    i
                     5.4 LB SIP          slab                    0.13228 in.   450.3 F
                                                                    i
============================================================     -----
                     RTV-560             thin skin               0.01366 in.   350.0 F
============================================================     -----
                                                                    i
                     ALUMINUM 7075-T6    slab                    0.10000 in.   350.0 F
                                                                    i
============================================================     -----
```

THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH = 2

PANEL	LAYER01		LAYER02		LAYER03		LAYER04		LAYER05		LAYER06	
5	0.00809	2085.86	1.07279	2084.05	0.01341	550.33	0.12521	449.17	0.01356	397.50	0.10000	345.82
6	0.00866	2048.08	1.14599	2046.21	0.01362	448.50	0.16181	448.50	0.01380	284.53	0.10000	284.53
7	0.00906	2048.02	1.20439	2047.08	0.01267	550.33	0.19553	448.51	0.01274	366.55	0.10000	284.60
8	0.00895	2085.86	1.17307	2082.24	0.01565	449.15	0.16864	449.15	0.01605	345.83	0.10000	345.83
9	0.00894	2012.28	1.17295	2010.45	0.01568	449.53	0.16868	449.53	0.01608	285.67	0.10000	285.67
10	0.00906	2048.08	1.20426	2047.15	0.01276	550.33	0.19552	448.50	0.01283	366.52	0.10000	284.53
11	0.00866	1958.79	1.14573	1956.92	0.01370	371.62	0.16185	371.62	0.01388	349.96	0.10000	349.96
12	0.00809	2085.86	1.07271	2084.05	0.01342	550.33	0.12518	449.15	0.01357	397.49	0.10000	345.83
21	0.00908	2012.28	1.17915	2011.37	0.01135	550.33	0.19584	449.53	0.01135	367.60	0.10000	285.67
22	0.00840	1768.11	1.03825	1766.16	0.01830	444.03	0.10597	444.03	0.01909	347.47	0.10000	347.47
23	0.00800	1958.79	0.96897	1957.85	0.02282	550.33	0.05276	371.62	0.02410	360.79	0.10000	349.96
24	0.00800	1878.00	0.87960	1876.45	0.02532	446.87	0.00935	446.87	0.02689	347.45	0.10000	347.45
25	0.00800	1919.97	0.87980	1919.01	0.02533	550.33	0.00922	362.49	0.02689	372.24	0.10000	349.96
26	0.00800	1958.79	0.96894	1957.85	0.02284	550.33	0.05272	371.57	0.02410	360.77	0.10000	349.96
27	0.00840	1968.20	1.03849	1967.30	0.01832	550.33	0.10579	401.04	0.01909	363.66	0.10000	326.27
28	0.00908	2012.29	1.17920	2011.38	0.01135	550.33	0.19584	449.53	0.01135	367.60	0.10000	285.68
37	0.00808	1878.18	0.90940	1877.41	0.01010	550.33	0.11594	446.87	0.01010	397.16	0.10000	347.45
38	0.00802	1810.15	0.84728	1809.26	0.01002	550.33	0.11318	450.22	0.01002	399.33	0.10000	348.43
39	0.00800	1765.94	0.80846	1764.96	0.01000	550.33	0.11018	450.29	0.01000	399.48	0.10000	348.67
40	0.00802	1764.96	0.79162	1744.14	0.01002	550.33	0.10767	448.40	0.01002	398.41	0.10000	348.42
41	0.00805	1764.96	0.79410	1744.96	0.01006	550.33	0.10637	446.03	0.01006	397.00	0.10000	347.96
42	0.00808	1768.11	0.81500	1767.13	0.01010	550.33	0.10675	444.03	0.01010	395.75	0.10000	347.47
43	0.00810	1812.31	0.85393	1811.41	0.01012	550.33	0.10970	443.86	0.01012	395.54	0.10000	347.22
44	0.00808	1878.00	0.90939	1877.22	0.01010	550.33	0.11594	446.87	0.01010	397.16	0.10000	347.45

OPTIMIZATION SYSTEM FOR TPSSYM = 3

TOTAL NUMBER OF DESIGN VARIABLES = 60
TOTAL NUMBER OF CONSTRAINS = 2584
TOTAL NUMBER OF TEMP. CONSTRAINS = 1584
TOTAL NUMBER OF TEMP. PRINTOUTS = 22

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MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
    X   0.1983E+04
   1.0 B     B
       |          B
       |                B     B
       |                            B    B
       |                                       B     B    B
       |                                                        B
       |                                                              B     B    B
       |                                                                    A          B     B
       F     F    F     F     F     F    F     F     F    D     D     D     D    D     A     A    B     B    B     B
       |                                                  F     F     F     F    F     F     F    F     F    F     F    F
   0.0 +-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+
       |
       |
       |
       |
       |
       |
       |
       |
       |
  -1.0 +
       .05         .15         .25         .35         .45         .55         .65         .75         .85         .95      1.05
                                                            TIME  ( X 2.803E-44 )
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MAXIMUM TEMPERATURE OF EVERY LAYER

LAYER:	1	2	3	4	5	6
Tmax:	2300.33	2400.33	550.33	450.33	550.33	350.33
Optv:	1982.72	1979.12	450.29	450.29	350.23	350.23

VALUES OF DESIGN VARIABLES :

LAYER	DEV01	DEV02	DEV03	DEV04	DEV05	DEV06	DEV07	DEV08	DEV09	DEV10	DEV11	DEV12
1	0.00808	0.00800	0.00800	0.00810	0.00800	0.00800	0.00800	0.00800	0.00800	0.00809	0.00800	0.00800
2	0.69612	0.50000	0.50000	0.87185	0.50000	0.50000	0.85142	0.50000	0.50000	0.68282	0.50000	0.50000
3	0.01010	0.01000	0.01000	0.01013	0.01000	0.01000	0.01000	0.01000	0.01000	0.01011	0.01000	0.01000
4	0.10220	0.01500	0.01500	0.11240	0.01500	0.01500	0.11065	0.01500	0.01500	0.10181	0.01500	0.01500
5	0.01010	0.01000	0.01000	0.01013	0.01000	0.01000	0.01000	0.01000	0.01000	0.01011	0.01000	0.01000

THE ORIGINAL OBJECTIVE FUNCTION = 112.6533356

THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.6718338

THE TOTAL OPTIMAL WEIGHT = 7.69771397E+03

OPTIMAL STRUCTURES OF TPS FOR PATCH = 3
(WITH AVERAGE THICKNESS)

RCG COATING	slab	0.00802 in.	1982.7 F
LI900	slab	0.59185 in.	1979.1 F
RTV-560	thin skin	0.01003 in.	450.3 F
5.4 LB SIP	slab	0.04559 in.	450.3 F
RTV-560	thin skin	0.01003 in.	350.2 F
ALUMINUM 7075-T6	slab	0.10000 in.	350.2 F

THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH = 3

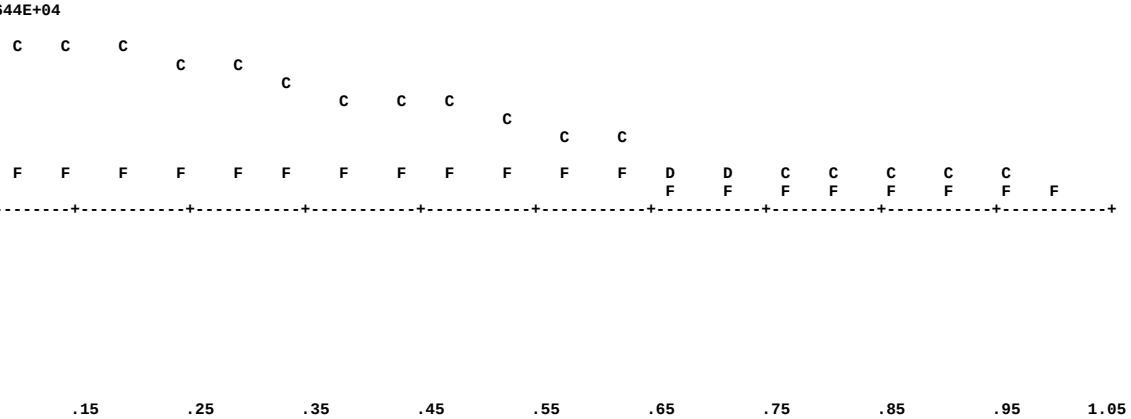
PANEL	LAYER01		LAYER02		LAYER03		LAYER04		LAYER05		LAYER06	
49	0.00802	1982.72	0.88797	1980.92	0.01003	550.33	0.11241	449.37	0.01003	399.48	0.10000	349.58
50	0.00800	1982.72	0.85142	1980.92	0.01000	550.33	0.11065	450.29	0.01000	400.26	0.10000	350.23
51	0.00801	1882.05	0.77996	1880.72	0.01002	550.33	0.10650	449.66	0.01002	399.78	0.10000	349.90
52	0.00809	1731.14	0.68282	1730.50	0.01011	550.33	0.10181	448.47	0.01011	398.19	0.10000	347.91
61	0.00808	1752.06	0.69612	1751.29	0.01010	550.33	0.10220	448.14	0.01010	397.90	0.10000	347.66
62	0.00812	1887.79	0.80441	1886.39	0.01015	550.33	0.10838	447.40	0.01015	397.07	0.10000	346.73
63	0.00810	1982.57	0.87185	1980.74	0.01013	550.33	0.11240	448.17	0.01013	397.67	0.10000	347.18
64	0.00807	1982.72	0.89596	1980.92	0.01008	550.33	0.11312	448.50	0.01008	398.42	0.10000	348.34
65	0.00802	1957.29	0.84645	1955.45	0.01003	550.33	0.10204	440.60	0.01003	395.85	0.10000	350.23
66	0.00800	1332.29	0.81470	1331.53	0.01000	349.33	0.10065	349.33	0.01000	346.38	0.10000	346.38
67	0.00801	1822.98	0.75039	1821.75	0.01001	550.33	0.09684	438.45	0.01001	393.68	0.10000	348.91
68	0.00808	1217.05	0.66371	1216.18	0.01010	310.49	0.09274	310.49	0.01010	307.82	0.10000	307.82
77	0.00807	1699.86	0.67563	1699.12	0.01009	550.33	0.09309	434.64	0.01009	389.50	0.10000	344.36
78	0.00810	1828.05	0.77225	1826.75	0.01013	550.33	0.09852	436.33	0.01013	391.15	0.10000	345.98
79	0.00809	1918.41	0.83299	1916.73	0.01012	550.33	0.10222	438.81	0.01012	393.43	0.10000	348.05
80	0.00806	1956.67	0.85376	1954.83	0.01008	550.33	0.10268	439.77	0.01008	394.84	0.10000	349.91
81	0.00802	1867.32	0.79189	1865.71	0.01002	550.33	0.08832	428.75	0.01002	390.81	0.10000	350.23
82	0.00800	1832.90	0.76597	1831.44	0.01000	550.33	0.08739	428.04	0.01000	389.80	0.10000	350.23
83	0.00801	1744.04	0.71122	1742.94	0.01001	550.33	0.08404	423.43	0.01001	385.43	0.10000	347.43
84	0.00807	1614.01	0.63837	1613.42	0.01008	550.33	0.08070	416.82	0.01008	378.42	0.10000	340.03
93	0.00806	1629.93	0.64843	1629.23	0.01008	550.33	0.08100	416.56	0.01008	378.19	0.10000	339.83
94	0.00809	1748.21	0.72967	1747.05	0.01011	550.33	0.08545	421.49	0.01011	383.14	0.10000	344.80
95	0.00808	1832.60	0.78144	1831.12	0.01010	550.33	0.08871	426.20	0.01010	387.61	0.10000	349.02
96	0.00805	1866.75	0.79800	1865.14	0.01006	550.33	0.08886	427.99	0.01006	389.91	0.10000	350.23
97	0.00801	1764.92	0.73052	1763.57	0.01002	550.33	0.07289	415.09	0.01002	384.81	0.10000	350.23
98	0.00800	1735.20	0.71114	1733.96	0.01000	550.33	0.07247	413.34	0.01000	382.67	0.10000	350.23
99	0.00801	1654.07	0.66718	1653.11	0.01001	550.33	0.06964	406.21	0.01001	375.83	0.10000	345.45
100	0.00805	1537.38	0.60984	1536.82	0.01006	550.33	0.06716	396.15	0.01006	365.39	0.10000	334.62
109	0.00805	1092.31	0.61783	1091.49	0.01006	280.47	0.06739	280.47	0.01006	278.28	0.10000	278.28
110	0.00807	1657.24	0.68178	1656.23	0.01009	550.33	0.07076	404.48	0.01009	373.83	0.10000	343.17
111	0.00806	1200.61	0.72341	1199.88	0.01008	312.97	0.07352	312.97	0.01008	310.49	0.10000	310.49
112	0.00804	1764.41	0.73532	1763.05	0.01005	550.33	0.07332	414.42	0.01005	384.02	0.10000	350.23
113	0.00801	1676.85	0.67854	1675.72	0.01001	550.33	0.05984	403.15	0.01001	379.35	0.10000	350.23
114	0.00800	1651.02	0.66461	1649.97	0.01000	550.33	0.05980	400.50	0.01000	376.26	0.10000	350.23
115	0.00801	1576.54	0.62986	1575.70	0.01001	550.33	0.05744	391.29	0.01001	367.36	0.10000	343.44
116	0.00804	1471.15	0.58564	1470.61	0.01005	550.33	0.05567	378.33	0.01005	354.04	0.10000	329.75
125	0.00804	1481.12	0.59187	1480.52	0.01005	550.33	0.05585	378.15	0.01005	353.88	0.10000	329.61
126	0.00805	1578.86	0.64120	1577.99	0.01007	550.33	0.05832	389.74	0.01007	365.60	0.10000	341.47
127	0.00805	1650.57	0.67418	1649.50	0.01006	550.33	0.06062	399.03	0.01006	374.56	0.10000	350.09
128	0.00803	1676.39	0.68225	1675.26	0.01004	550.33	0.06016	402.55	0.01004	378.66	0.10000	350.23
129	0.00801	1596.97	0.63222	1596.04	0.01001	550.33	0.04820	392.12	0.01001	374.09	0.10000	350.23
130	0.00800	1574.49	0.62307	1573.61	0.01000	550.33	0.04850	388.67	0.01000	370.16	0.10000	350.23
131	0.00800	1506.04	0.59658	1505.31	0.01001	550.33	0.04657	377.62	0.01001	359.45	0.10000	341.29
132	0.00803	1410.72	0.56403	1410.21	0.01004	550.33	0.04540	362.10	0.01004	343.59	0.10000	325.09
141	0.00803	1418.24	0.56868	1417.68	0.01004	550.33	0.04554	361.96	0.01004	343.47	0.10000	324.98
142	0.00804	1507.62	0.60501	1506.85	0.01005	550.33	0.04721	376.25	0.01005	357.92	0.10000	339.60
143	0.00804	1573.99	0.63023	1573.09	0.01005	550.33	0.04911	387.35	0.01005	368.68	0.10000	350.01
144	0.00802	1596.56	0.63496	1595.62	0.01003	550.33	0.04844	391.58	0.01003	373.49	0.10000	350.23
145	0.00801	1512.52	0.58442	1511.79	0.01001	550.33	0.03620	380.17	0.01001	368.11	0.10000	350.23
146	0.00800	1493.34	0.58005	1492.63	0.01000	550.33	0.03679	375.88	0.01000	363.32	0.10000	350.23
147	0.00800	1431.26	0.56218	1430.65	0.01000	550.33	0.03532	362.98	0.01000	350.78	0.10000	338.57
148	0.00802	1346.34	0.54165	1345.85	0.01002	550.33	0.03478	344.86	0.01002	332.35	0.10000	319.84
157	0.00802	1351.32	0.54468	1350.80	0.01002	550.33	0.03486	344.75	0.01002	332.25	0.10000	319.75
158	0.00803	1432.07	0.56761	1431.43	0.01003	550.33	0.03574	361.81	0.01003	349.50	0.10000	337.18
159	0.00802	1492.79	0.58471	1492.07	0.01003	550.33	0.03719	374.74	0.01003	362.07	0.10000	349.40
160	0.00801	1512.16	0.58616	1511.42	0.01002	550.33	0.03635	379.71	0.01002	367.61	0.10000	350.23
161	0.00800	1427.23	0.53786	1426.69	0.01000	550.33	0.02451	367.67	0.01000	361.43	0.10000	350.23
162	0.00800	1411.00	0.53795	1410.47	0.01000	550.33	0.02533	362.57	0.01000	355.83	0.10000	349.10
163	0.00800	1355.36	0.52861	1354.86	0.01000	550.33	0.02435	347.94	0.01000	341.55	0.10000	335.16
164	0.00801	1280.58	0.51974	1280.12	0.01001	550.33	0.02437	327.32	0.01001	320.68	0.10000	314.05
173	0.00801	1283.06	0.52118	1282.58	0.01001	550.33	0.02442	327.25	0.01001	320.62	0.10000	313.99

174	0.00801	1355.43	0.53111	1354.91	0.01001	550.33	0.02454	346.96	0.01001	340.52	0.10000	334.09
175	0.00801	1410.42	0.54016	1409.86	0.01001	550.33	0.02552	361.62	0.01001	354.83	0.10000	348.04
176	0.00801	1426.93	0.53864	1426.38	0.01001	550.33	0.02458	367.29	0.01001	361.03	0.10000	350.23
177	0.00800	1346.36	0.49630	1345.99	0.01000	550.33	0.01407	355.19	0.01000	354.15	0.10000	350.23
178	0.00800	1332.29	0.50000	1331.91	0.01000	550.33	0.01500	349.33	0.01000	347.85	0.10000	346.38
179	0.00800	1282.80	0.49851	1282.41	0.01000	550.33	0.01451	333.25	0.01000	332.09	0.10000	330.93
180	0.00800	1217.05	0.50000	1216.62	0.01000	550.33	0.01500	310.49	0.01000	309.16	0.10000	307.82
189	0.00800	1217.27	0.50000	1216.83	0.01000	550.33	0.01500	310.46	0.01000	309.12	0.10000	307.78
190	0.00800	1282.23	0.49838	1281.82	0.01000	550.33	0.01450	332.49	0.01000	331.33	0.10000	330.16
191	0.00800	1331.70	0.50000	1331.30	0.01000	550.33	0.01500	348.57	0.01000	347.09	0.10000	345.61
192	0.00800	1346.11	0.49623	1345.74	0.01000	550.33	0.01407	354.89	0.01000	353.85	0.10000	350.23
193	0.00800	1276.24	0.46421	1276.02	0.01000	550.33	0.00800	346.39	0.01000	349.38	0.10000	349.38
194	0.00800	1263.26	0.47017	1263.00	0.01000	550.33	0.00800	339.61	0.01000	342.28	0.10000	342.28
195	0.00800	1219.07	0.47508	1218.75	0.01000	550.33	0.00800	322.84	0.01000	325.76	0.10000	325.76
196	0.00800	1160.35	0.48448	1159.93	0.00999	550.33	0.00800	298.48	0.00999	301.32	0.10000	301.32
205	0.00800	1158.75	0.48335	1158.34	0.00999	550.33	0.00800	298.46	0.00999	301.30	0.10000	301.30
206	0.00800	1218.01	0.47290	1217.69	0.00999	550.33	0.00800	322.31	0.00999	325.27	0.10000	325.27
207	0.00800	1262.69	0.46844	1262.42	0.00999	550.33	0.00800	339.09	0.00999	341.79	0.10000	341.79
208	0.00800	1276.06	0.46347	1275.83	0.00999	550.33	0.00800	346.18	0.00999	349.19	0.10000	349.19
209	0.00800	1224.18	0.44656	1224.04	0.01000	550.33	0.00800	338.36	0.01000	343.58	0.10000	343.58
210	0.00800	1210.66	0.45282	1210.47	0.01000	550.33	0.00800	331.41	0.01000	336.51	0.10000	336.51
211	0.00800	1170.41	0.46185	1170.14	0.01000	550.33	0.00800	314.29	0.01000	319.54	0.10000	319.54
212	0.00800	1115.61	0.47545	1115.20	0.00999	550.33	0.00800	289.46	0.00999	294.75	0.10000	294.75
221	0.00800	1112.90	0.47367	1112.52	0.00999	550.33	0.00800	289.45	0.00999	294.74	0.10000	294.74
222	0.00800	1169.13	0.45852	1168.85	0.00998	550.33	0.00800	313.98	0.00998	319.29	0.10000	319.29
223	0.00800	1210.16	0.45007	1209.96	0.00998	550.33	0.00800	331.09	0.00998	336.25	0.10000	336.25
224	0.00800	1224.06	0.44546	1223.91	0.00999	550.33	0.00800	338.23	0.00999	343.49	0.10000	343.49
225	0.00800	1197.30	0.44810	1197.15	0.01000	550.33	0.00800	330.29	0.01000	335.38	0.10000	335.38
226	0.00800	1181.18	0.45210	1181.00	0.01000	550.33	0.00800	323.57	0.01000	328.83	0.10000	328.83
227	0.00800	1142.97	0.46221	1142.70	0.01000	550.33	0.00800	307.00	0.01000	312.24	0.10000	312.24
228	0.00800	1091.90	0.47508	1087.54	0.00999	550.33	0.00800	282.91	0.00999	288.36	0.10000	288.36
237	0.00800	1091.90	0.47327	1084.71	0.00999	550.33	0.00800	282.91	0.00999	288.35	0.10000	288.35
238	0.00800	1141.79	0.45891	1141.52	0.00998	550.33	0.00800	306.85	0.00998	312.15	0.10000	312.15
239	0.00800	1180.79	0.44932	1180.60	0.00998	550.33	0.00800	323.42	0.00998	328.74	0.10000	328.74
240	0.00800	1197.22	0.44703	1197.07	0.00999	550.33	0.00800	330.24	0.00999	335.35	0.10000	335.35
241	0.00800	1201.44	0.47256	1201.20	0.01000	550.33	0.00811	322.46	0.01000	324.56	0.10000	324.57
242	0.00800	1180.35	0.47135	1180.10	0.01000	550.33	0.00800	316.45	0.01000	319.11	0.10000	319.11
243	0.00800	1141.85	0.47882	1141.53	0.01000	550.33	0.00808	301.45	0.01000	303.88	0.10000	303.88
244	0.00800	1091.90	0.48510	1081.24	0.00999	550.33	0.00800	279.56	0.00999	282.39	0.10000	282.39
253	0.00800	1091.90	0.48401	1079.39	0.00999	550.33	0.00800	279.53	0.00999	282.37	0.10000	282.37
254	0.00800	1141.16	0.47697	1140.85	0.00999	550.33	0.00800	301.40	0.00999	303.87	0.10000	303.87
255	0.00800	1180.15	0.46968	1179.89	0.00999	550.33	0.00800	316.40	0.00999	319.10	0.10000	319.10
256	0.00800	1201.42	0.47200	1201.17	0.00999	550.33	0.00806	322.44	0.00999	324.56	0.10000	324.56
257	0.00800	1221.09	0.50000	1220.73	0.01000	550.33	0.01500	319.12	0.01000	317.85	0.10000	316.59
258	0.00800	1200.64	0.50000	1200.27	0.01000	550.33	0.01500	312.98	0.01000	311.74	0.10000	310.50
259	0.00800	1157.63	0.50000	1157.24	0.01000	550.33	0.01500	300.05	0.01000	298.87	0.10000	297.70
260	0.00800	1092.61	0.50000	1092.20	0.01000	550.33	0.01500	280.51	0.01000	279.42	0.10000	278.33
269	0.00800	1092.31	0.50000	1091.90	0.01000	550.33	0.01500	280.47	0.01000	279.37	0.10000	278.28
270	0.00800	1157.52	0.50000	1157.13	0.01000	550.33	0.01500	300.03	0.01000	298.85	0.10000	297.67
271	0.00800	1200.61	0.50000	1200.25	0.01000	550.33	0.01500	312.97	0.01000	311.73	0.10000	310.49
272	0.00800	1221.08	0.50000	1220.73	0.01000	550.33	0.01500	319.11	0.01000	317.85	0.10000	316.59

OPTIMIZATION SYSTEM FOR TPSSYM = 4

TOTAL NUMBER OF DESIGN VARIABLES = 60
TOTAL NUMBER OF CONSTRAINS = 2584
TOTAL NUMBER OF TEMP. CONSTRAINS = 1584
TOTAL NUMBER OF TEMP. PRINTOUTS = 22

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



MAXIMUM TEMPERATURE OF EVERY LAYER

LAYER:	1	2	3	4	5	6
Tmax:	2300.33	2020.33	1800.33	2020.33	550.33	350.33
Optv:	1643.91	1643.91	1637.62	356.70	350.07	350.08

VALUES OF DESIGN VARIABLES :

LAYER	DEV01	DEV02	DEV03	DEV04	DEV05	DEV06	DEV07	DEV08	DEV09	DEV10	DEV11	DEV12
1	0.00300	0.00300	0.00300	0.00300	0.00300	0.00300	0.00300	0.00300	0.00300	0.00300	0.00300	0.00300
2	0.00400	0.00400	0.00400	0.00400	0.00400	0.00400	0.00400	0.00400	0.00400	0.00400	0.00400	0.00400
3	0.48603	0.21535	0.20000	0.39225	0.20000	0.20000	0.39285	0.20000	0.20000	0.47696	0.21542	0.20000
4	0.01500	0.01500	0.01500	0.01500	0.01500	0.01500	0.01500	0.01500	0.01500	0.01500	0.01500	0.01500
5	0.00500	0.00500	0.00500	0.00500	0.00500	0.00500	0.00500	0.00500	0.00500	0.00500	0.00500	0.00500

THE ORIGINAL OBJECTIVE FUNCTION = 477.6333618

THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.0556153

THE TOTAL OPTIMAL WEIGHT = 1.17136855E+04

OPTIMAL STRUCTURES OF TPS FOR PATCH = 4
(WITH AVERAGE THICKNESS)

HRSI COAT	thin skin	0.00300 in.	1643.9 F
AB312 Fabric	slab	0.00400 in.	1643.9 F
Q-Felt(3.5 PCF)	slab	0.28157 in.	1637.6 F
AB312 Fabric	slab	0.01500 in.	356.7 F
RTV-560	thin skin	0.00500 in.	350.1 F
ALUMINUM 7075-T6	slab	0.20000 in.	350.1 F

THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH = 4

PANEL	LAYER01		LAYER02		LAYER03		LAYER04		LAYER05		LAYER06	
53	0.00300	1632.96	0.00400	1632.96	0.47696	1629.89	0.01500	991.67	0.00500	353.24	0.20000	349.96
54	0.00300	1561.58	0.00400	1561.58	0.42628	1558.06	0.01500	955.21	0.00500	352.44	0.20000	349.01
55	0.00300	1515.83	0.00400	1515.83	0.39285	1512.01	0.01500	931.86	0.00500	352.00	0.20000	348.47
56	0.00300	1489.47	0.00400	1489.47	0.37495	1485.52	0.01500	918.33	0.00500	351.52	0.20000	347.96
57	0.00300	1488.89	0.00400	1488.89	0.37445	1484.94	0.01500	918.03	0.00500	351.52	0.20000	347.98
58	0.00300	1515.15	0.00400	1515.15	0.39225	1511.33	0.01500	931.49	0.00500	351.99	0.20000	348.52
59	0.00300	1563.98	0.00400	1563.98	0.42823	1560.44	0.01500	956.36	0.00500	352.46	0.20000	349.09
60	0.00300	1643.91	0.00400	1643.91	0.48603	1640.76	0.01500	997.07	0.00500	353.30	0.20000	350.08
69	0.00300	1581.00	0.00400	1581.00	0.45008	1577.80	0.01500	966.04	0.00500	353.30	0.20000	350.08
70	0.00300	953.74	0.00400	953.74	0.40321	946.58	0.01500	313.40	0.00500	305.59	0.20000	305.59
71	0.00300	1460.16	0.00400	1460.16	0.37269	1456.36	0.01500	902.31	0.00500	348.48	0.20000	344.91
72	0.00300	1101.37	0.00400	1101.37	0.35606	1092.80	0.01500	356.70	0.00500	349.85	0.20000	349.86
73	0.00300	1432.21	0.00400	1432.21	0.35561	1428.30	0.01500	887.59	0.00500	347.18	0.20000	343.58
74	0.00300	1459.57	0.00400	1459.57	0.37216	1455.76	0.01500	902.02	0.00500	348.56	0.20000	345.03
75	0.00300	1509.06	0.00400	1509.06	0.40495	1505.47	0.01500	928.03	0.00500	350.77	0.20000	347.36
76	0.00300	1590.82	0.00400	1590.82	0.45819	1587.55	0.01500	970.88	0.00500	353.30	0.20000	350.08
85	0.00300	1511.42	0.00400	1511.42	0.41434	1508.04	0.01500	931.63	0.00500	353.30	0.20000	350.08
86	0.00300	1433.84	0.00400	1433.84	0.37262	1430.22	0.01500	889.13	0.00500	348.14	0.20000	344.63
87	0.00300	1385.75	0.00400	1385.75	0.34596	1381.96	0.01500	862.73	0.00500	343.64	0.20000	340.01
88	0.00300	1356.67	0.00400	1356.67	0.33085	1352.81	0.01500	846.90	0.00500	341.15	0.20000	337.46
89	0.00300	1356.24	0.00400	1356.24	0.33048	1352.39	0.01500	846.72	0.00500	341.22	0.20000	337.55
90	0.00300	1385.27	0.00400	1385.27	0.34550	1381.48	0.01500	862.56	0.00500	343.82	0.20000	340.22
91	0.00300	1435.69	0.00400	1435.69	0.37408	1432.05	0.01500	890.11	0.00500	348.34	0.20000	344.87
92	0.00300	1519.73	0.00400	1519.73	0.42118	1516.30	0.01500	935.73	0.00500	353.30	0.20000	350.08
101	0.00300	1431.98	0.00400	1431.98	0.37397	1428.42	0.01500	892.19	0.00500	353.30	0.20000	350.08
102	0.00300	1350.66	0.00400	1350.66	0.33816	1346.97	0.01500	845.92	0.00500	345.00	0.20000	341.43
103	0.00300	1301.04	0.00400	1301.04	0.31586	1297.28	0.01500	817.56	0.00500	337.89	0.20000	334.19
104	0.00300	1270.26	0.00400	1270.26	0.30257	1266.47	0.01500	800.27	0.00500	334.09	0.20000	330.32
105	0.00300	979.28	0.00400	979.28	0.30228	971.08	0.01500	324.63	0.00500	318.03	0.20000	318.03
106	0.00300	1300.68	0.00400	1300.68	0.31550	1296.93	0.01500	817.50	0.00500	338.17	0.20000	334.49
107	0.00300	849.52	0.00400	849.52	0.33932	843.07	0.01500	279.06	0.00500	271.85	0.20000	271.85
108	0.00300	1438.60	0.00400	1438.60	0.37939	1434.99	0.01500	895.46	0.00500	353.30	0.20000	350.08
117	0.00300	1363.39	0.00400	1363.39	0.33958	1359.66	0.01500	857.98	0.00500	353.30	0.20000	350.08
118	0.00300	1279.06	0.00400	1279.06	0.30890	1275.32	0.01500	808.59	0.00500	342.01	0.20000	338.40
119	0.00300	1228.16	0.00400	1228.16	0.29033	1224.42	0.01500	778.56	0.00500	332.68	0.20000	328.92
120	0.00300	1196.09	0.00400	1196.09	0.27867	1192.37	0.01500	760.11	0.00500	327.76	0.20000	323.93
121	0.00300	1195.85	0.00400	1195.85	0.27844	1192.12	0.01500	760.07	0.00500	327.91	0.20000	324.09
122	0.00300	1227.90	0.00400	1227.90	0.29005	1224.16	0.01500	778.60	0.00500	333.04	0.20000	329.30
123	0.00300	1280.24	0.00400	1280.24	0.30980	1276.50	0.01500	809.36	0.00500	342.39	0.20000	338.81
124	0.00300	1368.57	0.00400	1368.57	0.34378	1364.80	0.01500	860.54	0.00500	353.30	0.20000	350.08
133	0.00300	1300.89	0.00400	1300.89	0.30870	1297.01	0.01500	826.63	0.00500	353.30	0.20000	350.08
134	0.00300	1214.03	0.00400	1214.03	0.28275	1210.25	0.01500	774.55	0.00500	338.99	0.20000	335.35
135	0.00300	1161.99	0.00400	1161.99	0.26754	1158.28	0.01500	743.03	0.00500	327.68	0.20000	323.88
136	0.00300	1128.94	0.00400	1128.94	0.25741	1125.27	0.01500	723.62	0.00500	321.76	0.20000	317.88
137	0.00300	1128.77	0.00400	1128.77	0.25724	1125.10	0.01500	723.63	0.00500	321.94	0.20000	318.07
138	0.00300	1161.82	0.00400	1161.82	0.26733	1158.11	0.01500	743.15	0.00500	328.11	0.20000	324.32
139	0.00300	1214.94	0.00400	1214.94	0.28340	1211.15	0.01500	775.21	0.00500	339.44	0.20000	335.82
140	0.00300	1304.77	0.00400	1304.77	0.31182	1300.87	0.01500	828.56	0.00500	353.30	0.20000	350.08
149	0.00300	1234.39	0.00400	1234.39	0.27651	1230.37	0.01500	793.06	0.00500	353.30	0.20000	350.08
150	0.00300	1145.17	0.00400	1145.17	0.25562	1141.36	0.01500	738.30	0.00500	335.39	0.20000	331.72
151	0.00300	1091.97	0.00400	1091.97	0.24393	1088.30	0.01500	705.24	0.00500	322.02	0.20000	318.17
152	0.00300	1058.12	0.00400	1058.12	0.23552	1054.52	0.01500	684.95	0.00500	315.06	0.20000	311.13
153	0.00300	1058.02	0.00400	1058.02	0.23541	1054.42	0.01500	685.00	0.00500	315.26	0.20000	311.33

154	0.00300	1091.87	0.00400	1091.87	0.24379	1088.20	0.01500	705.44	0.00500	322.51	0.20000	318.67
155	0.00300	1145.78	0.00400	1145.78	0.25604	1141.96	0.01500	738.85	0.00500	335.90	0.20000	332.24
156	0.00300	1236.93	0.00400	1236.93	0.27851	1232.89	0.01500	794.33	0.00500	353.30	0.20000	350.08
165	0.00300	1166.61	0.00400	1166.61	0.24465	1162.44	0.01500	758.50	0.00500	353.30	0.20000	350.08
166	0.00300	1075.46	0.00400	1075.46	0.22901	1071.60	0.01500	701.29	0.00500	331.13	0.20000	327.44
167	0.00300	1021.14	0.00400	1021.14	0.22083	1017.50	0.01500	666.73	0.00500	315.73	0.20000	311.86
168	0.00300	986.84	0.00400	986.84	0.21427	983.31	0.01500	645.75	0.00500	307.74	0.20000	303.77
169	0.00300	986.80	0.00400	986.80	0.21423	983.27	0.01500	645.84	0.00500	307.96	0.20000	303.99
170	0.00300	1021.10	0.00400	1021.10	0.22076	1017.47	0.01500	667.00	0.00500	316.27	0.20000	312.40
171	0.00300	1075.75	0.00400	1075.75	0.22919	1071.91	0.01500	701.72	0.00500	331.69	0.20000	328.00
172	0.00300	1167.83	0.00400	1167.83	0.24556	1163.66	0.01500	759.12	0.00500	353.30	0.20000	350.08
181	0.00300	1101.35	0.00400	1101.35	0.21542	1097.06	0.01500	724.73	0.00500	353.26	0.20000	349.84
182	0.00300	1009.06	0.00400	1009.06	0.20493	1005.19	0.01500	665.60	0.00500	326.17	0.20000	322.47
183	0.00300	953.73	0.00400	953.73	0.20000	950.14	0.01500	629.69	0.00500	308.93	0.20000	305.03
184	0.00300	919.61	0.00400	919.61	0.19542	916.16	0.01500	608.35	0.00500	300.00	0.20000	296.00
185	0.00300	919.62	0.00400	919.62	0.19543	916.17	0.01500	608.47	0.00500	300.23	0.20000	296.23
186	0.00300	953.74	0.00400	953.74	0.20000	950.16	0.01500	629.99	0.00500	309.49	0.20000	305.59
187	0.00300	1009.06	0.00400	1009.06	0.20490	1005.20	0.01500	665.90	0.00500	326.75	0.20000	323.03
188	0.00300	1101.37	0.00400	1101.37	0.21535	1097.08	0.01500	724.75	0.00500	353.28	0.20000	349.86
197	0.00300	1043.40	0.00400	1043.40	0.19160	1039.04	0.01500	694.00	0.00500	349.90	0.20000	346.49
198	0.00300	951.11	0.00400	951.11	0.18585	947.25	0.01500	633.78	0.00500	320.47	0.20000	316.76
199	0.00300	895.08	0.00400	895.08	0.18363	891.54	0.01500	596.83	0.00500	301.76	0.20000	297.86
200	0.00300	861.87	0.00400	861.87	0.18103	858.51	0.01500	575.60	0.00500	292.06	0.20000	288.07
201	0.00300	861.91	0.00400	861.91	0.18107	858.55	0.01500	575.73	0.00500	292.28	0.20000	288.28
202	0.00300	895.10	0.00400	895.10	0.18368	891.57	0.01500	597.13	0.00500	302.30	0.20000	298.39
203	0.00300	950.85	0.00400	950.85	0.18565	947.00	0.01500	633.94	0.00500	321.02	0.20000	317.30
204	0.00300	1042.46	0.00400	1042.46	0.19076	1038.10	0.01500	693.54	0.00500	349.91	0.20000	346.49
213	0.00300	998.16	0.00400	998.16	0.17628	993.77	0.01500	668.86	0.00500	344.94	0.20000	341.54
214	0.00300	907.46	0.00400	907.46	0.17447	903.63	0.01500	608.75	0.00500	314.03	0.20000	310.35
215	0.00300	851.11	0.00400	851.11	0.17411	847.64	0.01500	571.24	0.00500	294.43	0.20000	290.55
216	0.00300	849.05	0.00400	845.82	0.17341	816.58	0.01500	550.75	0.00500	284.24	0.20000	280.28
217	0.00300	849.05	0.00400	845.82	0.17348	816.61	0.01500	550.87	0.00500	284.43	0.20000	280.46
218	0.00300	851.09	0.00400	851.09	0.17419	847.63	0.01500	571.48	0.00500	294.91	0.20000	291.02
219	0.00300	907.00	0.00400	907.00	0.17419	903.17	0.01500	608.78	0.00500	314.51	0.20000	310.81
220	0.00300	996.63	0.00400	996.63	0.17500	992.24	0.01500	668.10	0.00500	344.93	0.20000	341.51
229	0.00300	970.97	0.00400	970.97	0.17246	966.61	0.01500	651.87	0.00500	338.11	0.20000	334.73
230	0.00300	883.83	0.00400	883.83	0.17341	880.06	0.01500	593.41	0.00500	306.90	0.20000	303.27
231	0.00300	849.05	0.00400	845.82	0.17372	824.29	0.01500	555.95	0.00500	287.18	0.20000	283.37
232	0.00300	849.05	0.00400	845.82	0.17476	796.42	0.01500	537.00	0.00500	276.87	0.20000	272.99
233	0.00300	849.05	0.00400	845.82	0.17483	796.41	0.01500	537.06	0.00500	277.01	0.20000	273.12
234	0.00300	849.05	0.00400	845.82	0.17380	824.17	0.01500	556.07	0.00500	287.53	0.20000	283.70
235	0.00300	883.24	0.00400	883.24	0.17313	879.48	0.01500	593.30	0.00500	307.24	0.20000	303.59
236	0.00300	969.34	0.00400	969.34	0.17117	964.99	0.01500	651.06	0.00500	338.08	0.20000	334.69
245	0.00300	966.29	0.00400	966.29	0.18251	962.05	0.01500	645.21	0.00500	329.27	0.20000	325.93
246	0.00300	884.96	0.00400	884.96	0.18474	881.29	0.01500	590.18	0.00500	299.18	0.20000	295.63
247	0.00300	849.05	0.00400	845.82	0.18428	826.31	0.01500	553.50	0.00500	280.27	0.20000	276.56
248	0.00300	849.05	0.00400	845.82	0.18681	803.01	0.01500	536.98	0.00500	271.80	0.20000	271.80
249	0.00300	849.05	0.00400	845.82	0.18685	802.90	0.01500	536.96	0.00500	271.80	0.20000	271.80
250	0.00300	849.05	0.00400	845.82	0.18433	826.02	0.01500	553.43	0.00500	280.42	0.20000	276.70
251	0.00300	884.34	0.00400	884.34	0.18458	880.68	0.01500	589.95	0.00500	299.31	0.20000	295.74
252	0.00300	965.17	0.00400	965.17	0.18175	960.93	0.01500	644.63	0.00500	329.21	0.20000	325.87
261	0.00300	979.28	0.00400	979.28	0.20000	975.18	0.01500	647.85	0.00500	321.33	0.20000	318.03
262	0.00300	901.24	0.00400	901.24	0.20000	897.67	0.01500	595.65	0.00500	293.72	0.20000	290.23
263	0.00300	849.52	0.00400	849.52	0.20000	846.29	0.01500	561.07	0.00500	275.45	0.20000	271.85
264	0.00300	849.05	0.00400	845.82	0.20000	821.76	0.01500	544.57	0.00500	271.80	0.20000	271.80
265	0.00300	849.05	0.00400	845.82	0.20000	821.57	0.01500	544.47	0.00500	271.80	0.20000	271.80
266	0.00300	849.05	0.00400	849.05	0.20000	845.82	0.01500	560.81	0.00500	275.41	0.20000	271.80
267	0.00300	900.68	0.00400	900.68	0.20000	897.11	0.01500	595.34	0.00500	293.65	0.20000	290.16
268	0.00300	978.96	0.00400	978.96	0.20000	974.86	0.01500	647.66	0.00500	321.25	0.20000	317.95

```
**************************************
***                                ***
*** T P S O P T  T E R M I N A T E D ***
***                                ***
***         N O R M A L L Y        ***
***                                ***
***      11:36:45    09/08/2005    ***
***                                ***
**************************************
```

4.0 Blunt Nose Wedge

- *Purpose*: To demonstrate the applicability of the TPSOPT software system for a wedge with blunt nose over a wide range of flight conditions.

- *Input File*:
  - Standard input File: WEDGE_TPS.INP (Listing 4.1)
  - Aerodynamic Database: CFDTABLE.DAT (Listing 4.2)
  - Geometry File: CFDGEO.DAT (Binary file)
  - ZONAIR Solution File: THERMi (Listing 4.3)

- *Output File*:
  - Standard Output File: WEDGE_TPS.OUT (Listing 4.4)
  - Vehicle Surface Mesh: WEDGE30.NAS (Figure 4.1)
  - Response surfaces for POD analysis (Figure 4.4)
  - Cp and Temperature Plot File: CPTEMP.PLT (Figure 4.5)
  - Thickness Distribution Plot File: WEDGE30.PLT (Figure 4.6)

4.1 The Surface Mesh of the Blunt Nose Wedge

A blunt nose wedge configuration is analyzed in this example. The wedge is subjected to a two-dimentional flow condition in x-z-plane. Therefore, only one panel is placed along longitudinal dirction (y-direction) as shown in Figure 4.1. The surface mesh is generated by ZONAIR and outputted as the binary file “CFDGEO.DAT”. The surface consists of 64 panels and 66 grid points. These panels and grid points are stored in a file named CFDGEO.DAT which is used in TPSOPT by specifying the name on the second row of the aerodynamic database (CFDTABLE.DAT) that is imported by the “ASSIGN AEROBASE=” executive control command.

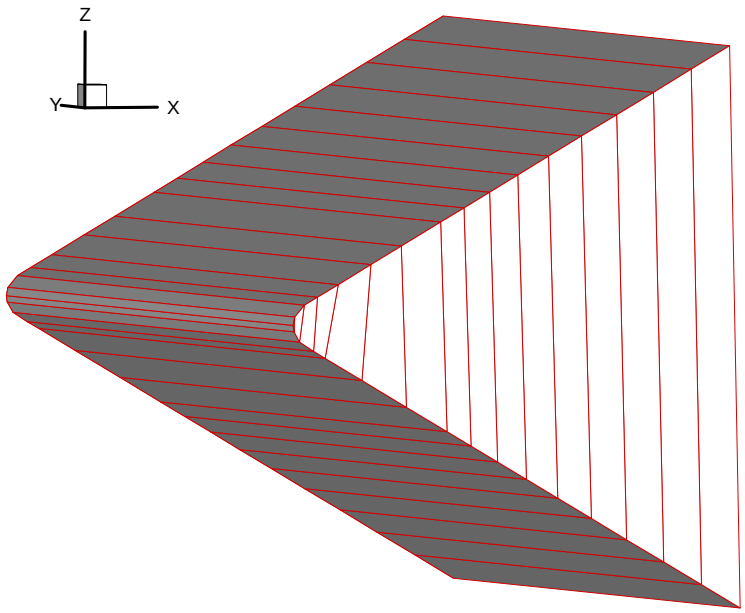


Figure 4.1. Blunt cone surface mesh

4.2 The Aerodynamic Database: CFDTABLE.DAT

The aerodynamic database is generated by running ZONAIR for 324 combinations of 9 Mach numbers (2,3,4,6,8,10,12,14,15) and 36 angles of attack (0,2,4,6,8,10,11-40). This file provides the TPSOPT system with all of the flow field information from ZONAIR. The first row is a title card (A WEDGE PROBLEM WITH 30 DEG OPENING ANGLE); the second row provide the geometry file name (CFDGEO.DAT); the third and fourth rows list the name of the reference chord, span, …etc, and their values, respectively; the fifth row lists the names of items in the following rows (Mach number, Altitude, Angle of attack, etc.) and the remaining rows contain the values of the items listed in the fifth row and the file names (THERM0001-THERM0324) in the last column which store the velocities and pressure coefficients for the combination of the Mach number and Angle of attack listed in the corresponding row.

4.3 The Standard Input File (WEDGE_TPS.INP)

The standard input file consists of two major parts: the airflow information and the TPS optimization system. The airflow information is provided by ZONAIR and imported by the aerodynamic database (CFDTABLE.DAT) using the following statement on the first row of the input file:

ASSIGN AEROBASE='CFDTABLE.DAT'

The TPS optimization system is the major portion of the standard input file, which includes the specification of trajectory data and definition of patches for the TPS. Three patches are defined over the TPS (Figure 4.2), among which patch 1 is located on the nose of the vehicle and patches

2 and 3 are for the remaing part. Figure 4.3 shows individual patches and panel numbers defined over them.

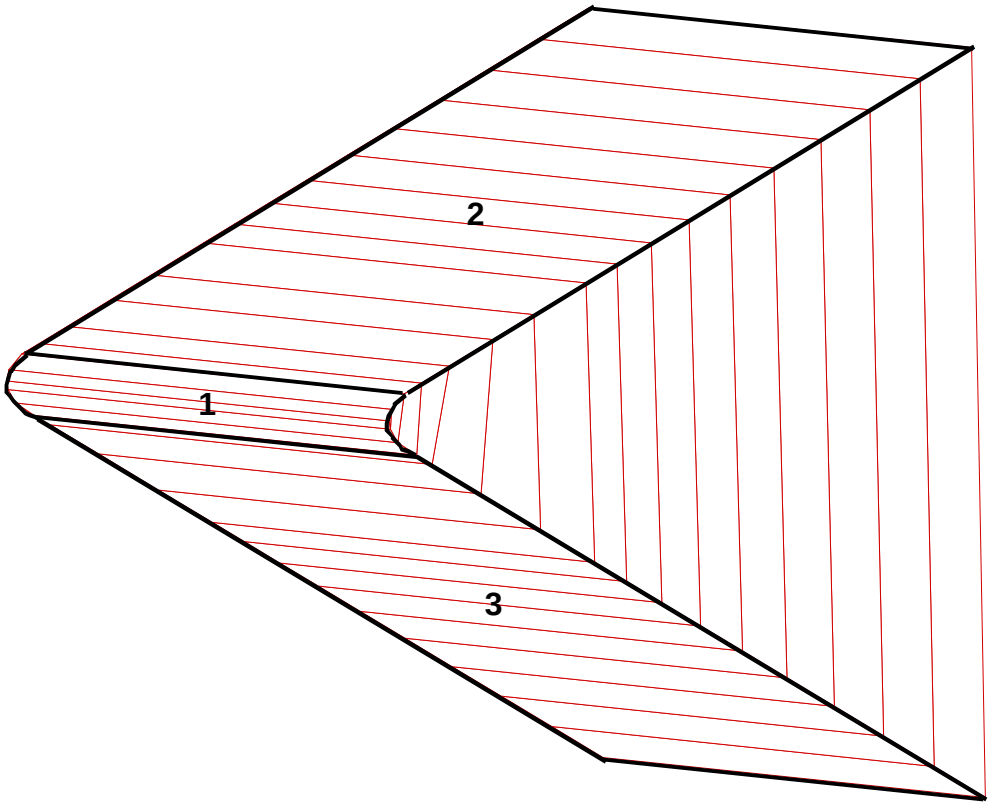
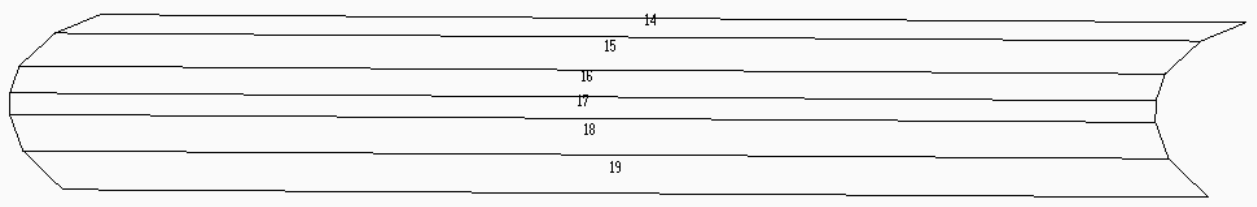
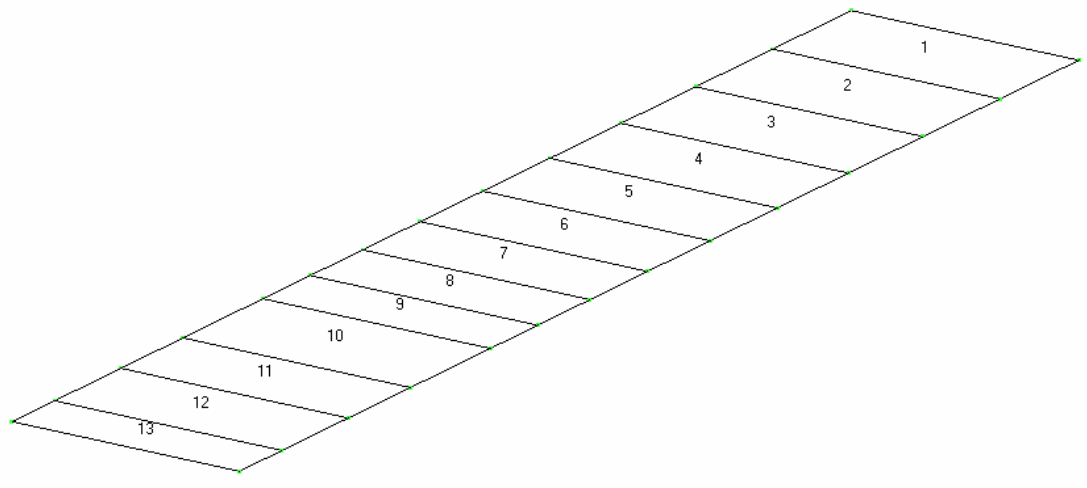


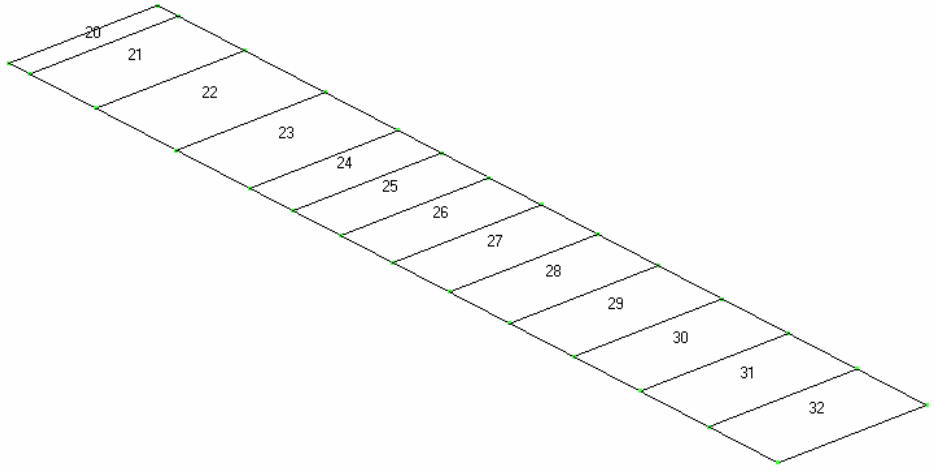
Figure 4.2. Three patches defined over the surface of the wedge



Patch 1 (Nose cap)



Patch 2 (Leeward side)



Patch 3 (Windward side)

Figure 4.3. Three separated patches defined over wedge

4.4 Thermal Structures for TPS

Two sets of 6 layered TPS structures are used for the blunt wedge configuration. The first one is for the nose patch (patch 1) and the windward side patch (patch 3), and the second one for the leeward patch (patch 2).

The thermal structures specified for the first set of TPS use the STTYPE numbers 1, 2, 3, 4, 5 and 6 are Slab, Slab, Thin skin, Slab, Thin skin and Slab, and the corresponding optimization materials are 508 (RCG Coating), 501 (LI-9000), 245 (RTV-560), 313 (5.4LB SIP), 245 (RTV-

560) and 103 (Aluminum). The maximum temperatures for these materials are: $2760\,^0R$, $2860\,^0R$, $1010\,^0R$, $910\,^0R$, $1010\,^0R$, and $810\,^0R$.

The structures specified for the second set of TPS are the AFRSI (Advanced Flexible Reusable Surface Insulation) TPS which consists of 6 layers: Thin skin, Slab, Slab, Slab, Thin skin and Slab denoted by the STTYPE numbers 31, 32, 33, 34, 35 and 36. The corresponding optimization materials are 221 (HRSI COAT), 266 (AB312 Fabric), 260 (Q-Felt) , 266 (AB312 Fabric), 245 (RTV-560) and 103 (Aluminum) and the maximum temperatures for these materials are: $2760\,^0R$, $2480\,^0R$, $2480\,^0R$, $2260\,^0R$, and $810\,^0R$.

The sixth layer of both sets of the TPS is defined as the structure layer. That means that the thickness of the sixth layer is constant during the computation of optimization.

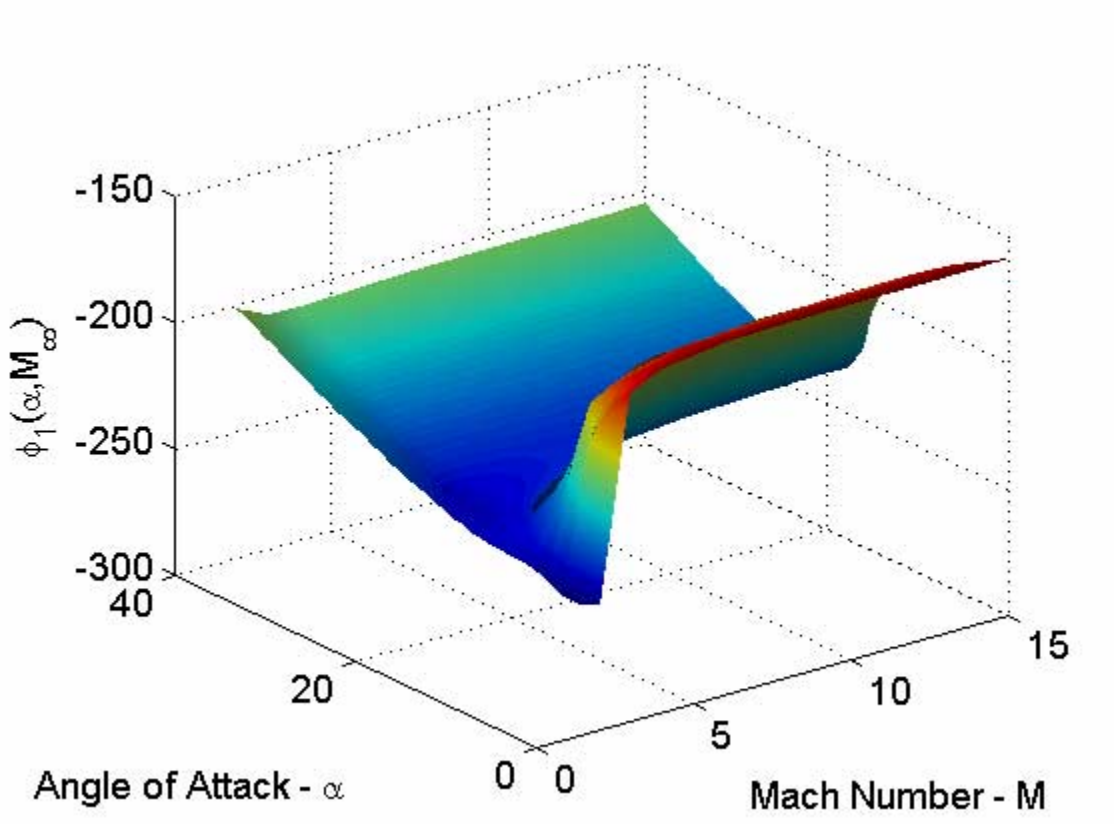
4.5 Output Information

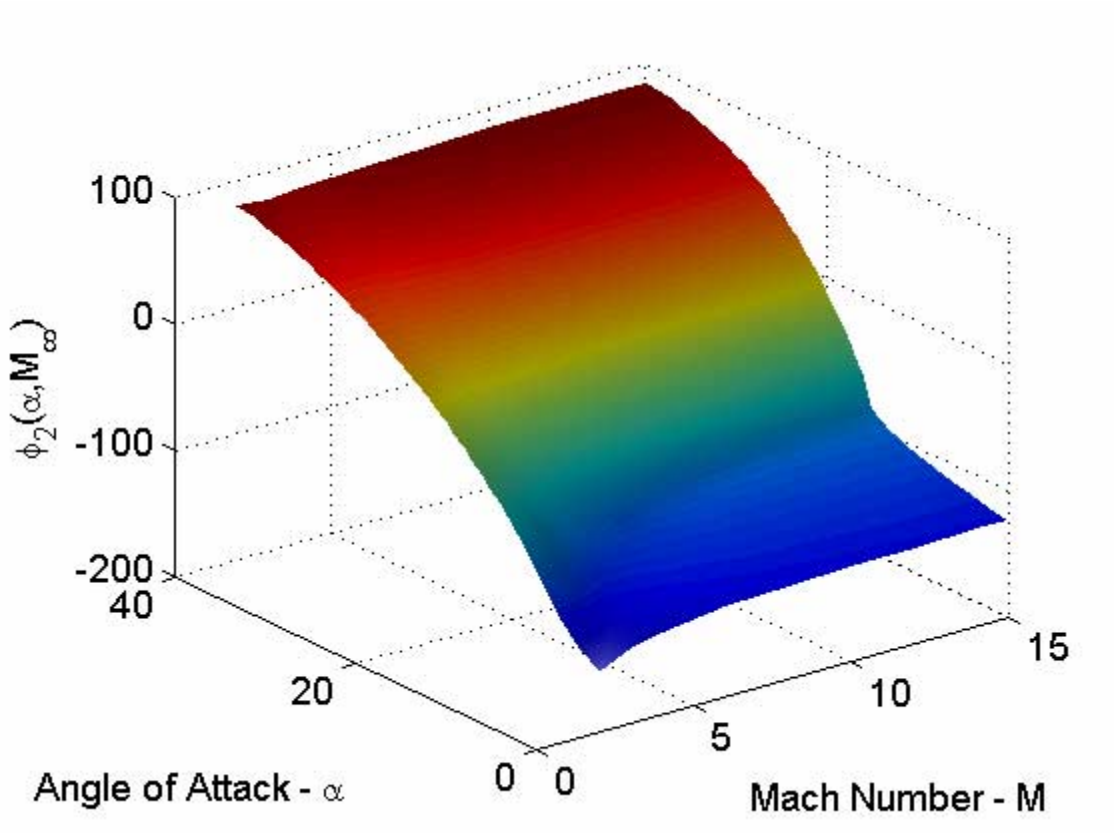
The output information consists of the following items:

(1) Response surfaces of C_p and velocities for POD analysis (Plot files).
(2) C_p and temperature for specified times in trajectory bulk data cards (Plot files).
(3) Schematic plotting of trajectory related thermal thantities versus time for over every patch. These quantities include enthalpy-based heat transfer coefficient, adiabatic wall enthalpy, and pressure.
(4) Thickness of every design layer and objective function value for every iteration.
(5) Schematic plotting of optimal thickness and maximum temperature for over each layer for every patch.
(6) Optimal thickness over each layer for every panel (Plot file).

4.6 Results

The outputted items listed in Section 4.5 have been stored in a text file and some plotting files. The test file is the Standard Output File (WEDGE_TPS.OUT) which includes all the input information from the Standard Input File (WEDGE_TPS.INP) and items (3)-(5) listed in the above section. Figures 4.4-4.6 show the response surfaces of Cp, Cp specified in trajectory bulk data card, and the optimal thickness, respectively.


-150
-200
-250
-300
$\phi_1(\alpha,M_\infty)$
40
20
0
Angle of Attack - α
0
5
10
15
Mach Number - M


100
0
-100
-200
$\phi_2(\alpha,M_\infty)$
40
20
0
Angle of Attack - α
0
5
10
15
Mach Number - M

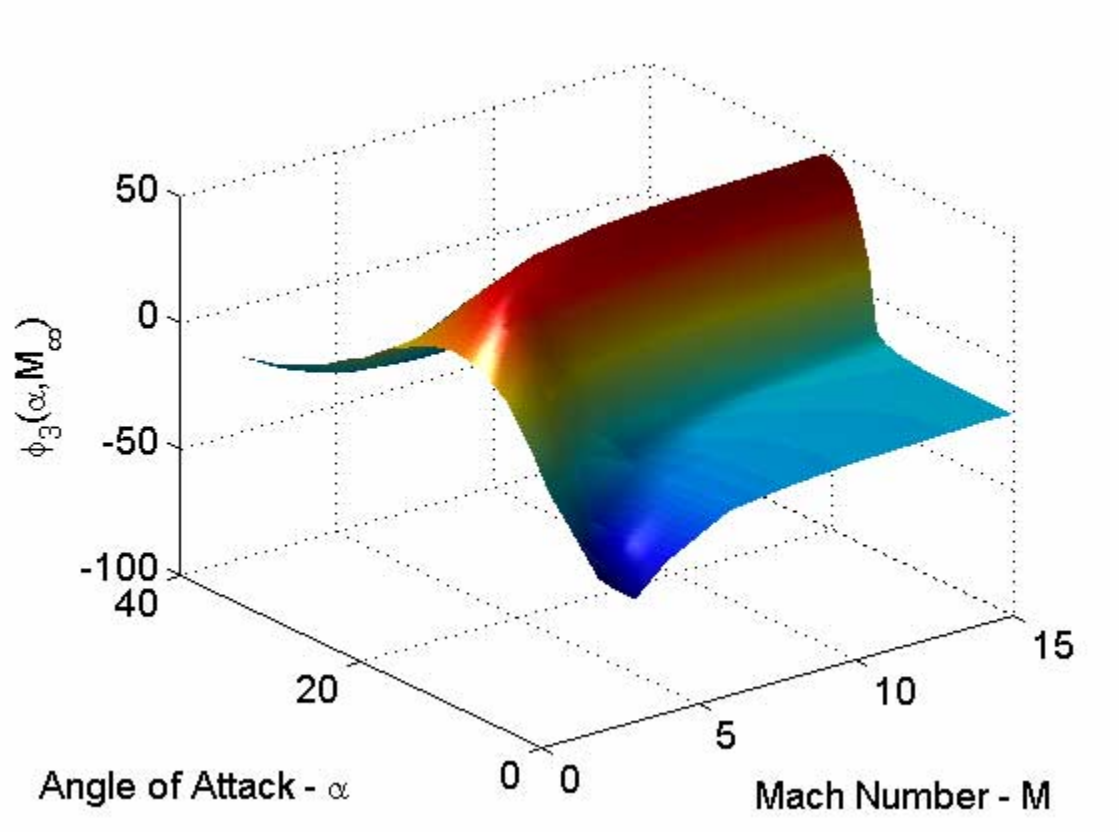
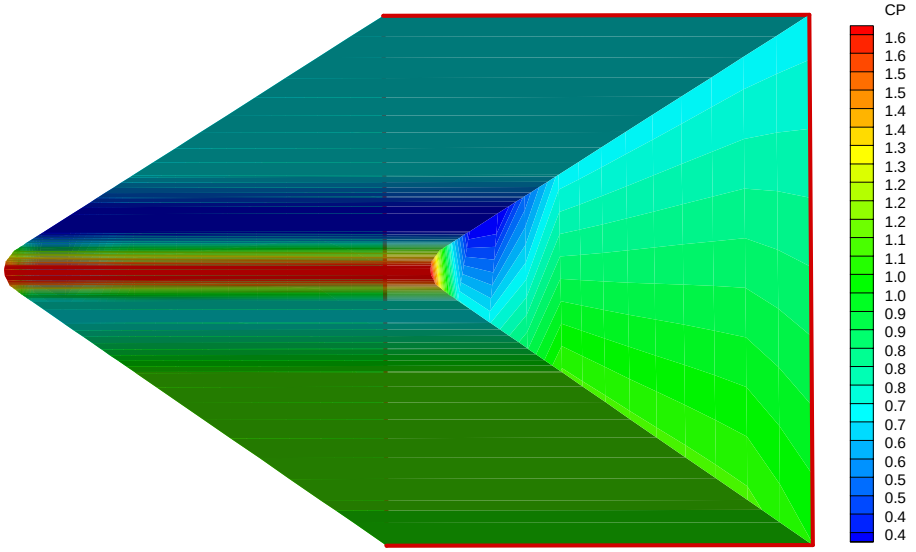


Figure 4.4. Response surfaces of first three modes for POD analysis directly using CFD results



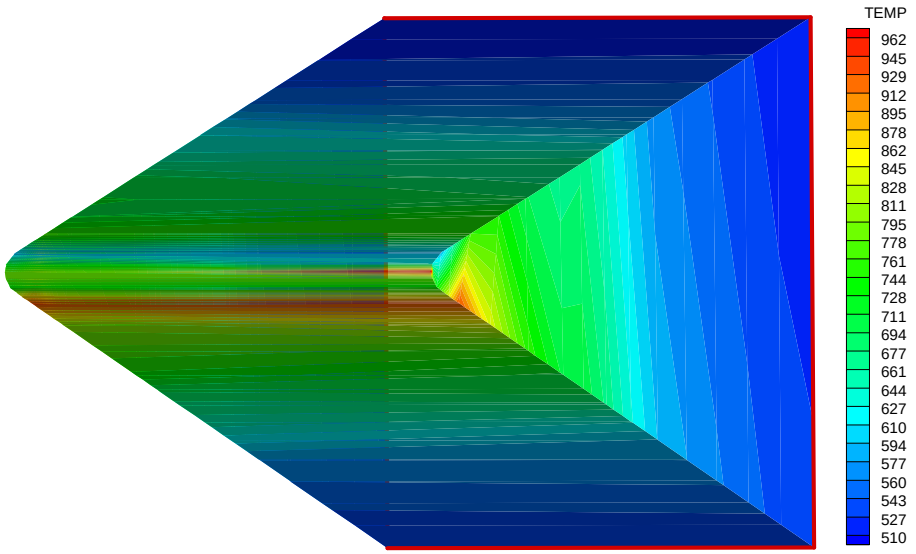
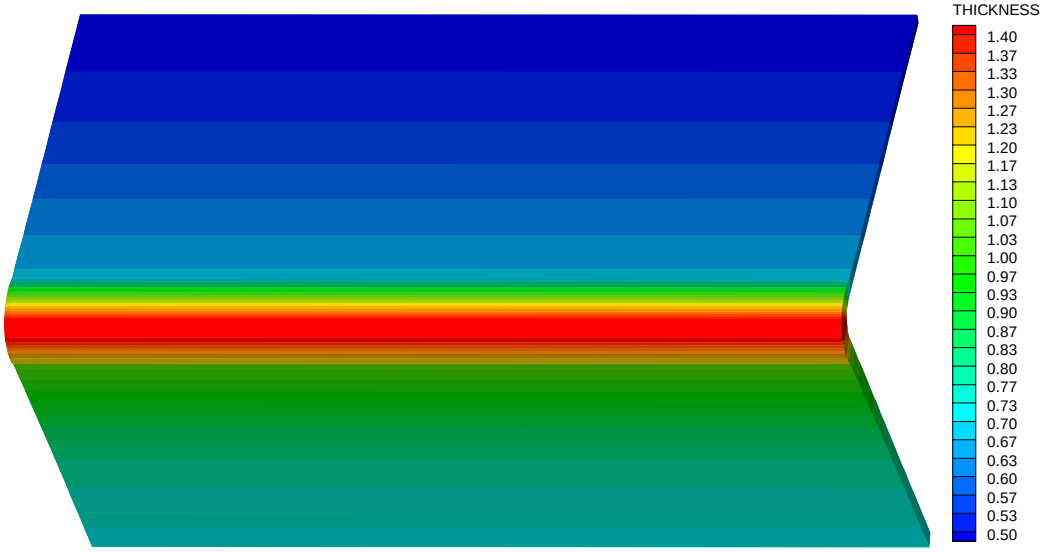


Figure 4.5. Plots of C_p and temperature at time=225 seconds (M=8.8, AoA=10.2)



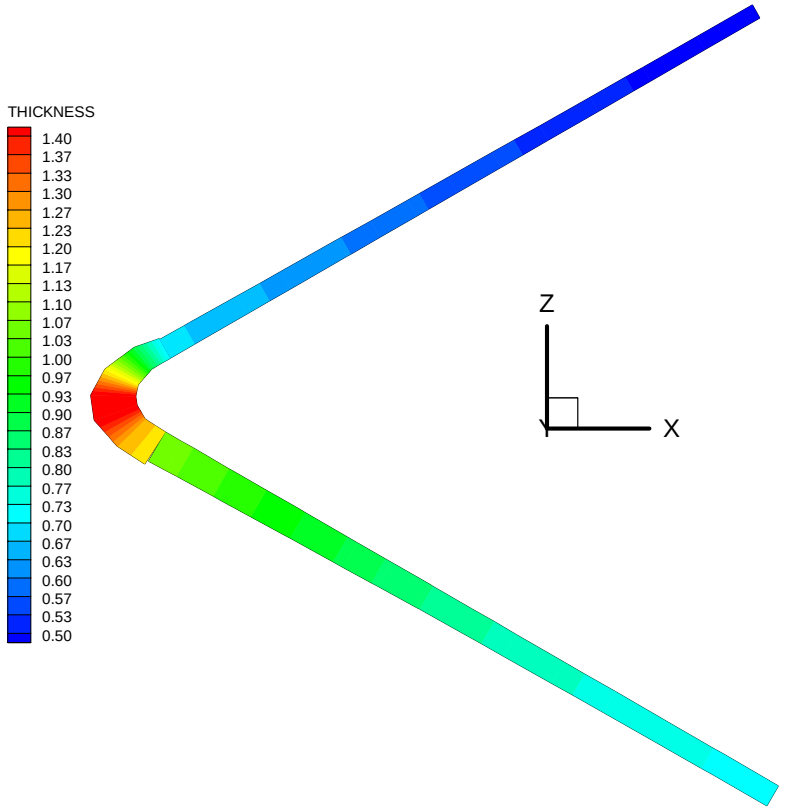


Figure 4.6. Optimal thickness plot

4.7 Lists of Input and Output Files

- *Input Data Listing:*

Listing 4.1 Standard input File: WEDGE_TPS.INP

```
ASSIGN AEROBASE='CFDTABLE.DAT',PRINT=0
$DIAG 1,2,3
SOL 1
$ Begin Executive Control Section
CEND
ECHO = SORT
SUBCASE = 1
        SUBTITLE=BENT-NOSE  BODY AT MACH 10.5, AoA=0.0 Degrees
        LABEL= HYPERSONIC AERODYNAMIC ANALYSIS
        TPSDES=1
$
BEGIN BULK
$
PLTAERO 1       YES     NO              NASTRAN AEROMESH.NAS
$ POLTTING TPS THICKNESS
PLTTPS   1      1       ALL     TECPLOT  WEDGELAYED.PLT  -1.0
PLTTPS  -2      1       ALL     TECPLOT  WEDGESINGL.PLT  -1.0
$
PARAM   STREAM  1.E-6
$
$PODRSM |TPSDES |METHOD |NRDMOD |TOLER  |NEURON |SAVE   |FILENM
```

```
PODRSM  1       1                               SAVE    WEDGE30.RST    CONT
CONT    CPPODRSM.P3D    UPODRSM.P3D      VPODRSM.P3D     WPODRSM.P3D
$
$TPSDES SETID   TPSSYM
TPSDES  1       1       1       1                                      CONT
CONT    1       2       3
$
$TPSSYM SETID   IDPATCH  NLAYER  PRVAL  MSGOUT
TPSSYM  1        1        6        4      5                             CONT
CONT    1        1      0.008   0.05                                    CONT
CONT    1        2      0.5     4.0                                     CONT
CONT    1        3      0.01    0.1                                     CONT
CONT    1        4      0.015   0.2                                     CONT
CONT    1        5      0.01    0.1                                     CONT
CONT    0        6      0.02    0.2
TPSSYM  2        2        6        4                                    CONT
CONT    2        31     0.005   0.1                                     CONT
CONT    2        32     0.005   0.1                                     CONT
CONT    2        33     0.3     5.0                                     CONT
CONT    2        34     0.02    1.0                                     CONT
CONT    2        35     0.01    0.8                                     CONT
CONT    0        36     0.01    1.0
TPSSYM  3        3        6        4                                    CONT
CONT    3        1      0.008   0.05                                    CONT
CONT    3        2      0.5     4.0                                     CONT
CONT    3        3      0.01    0.1                                     CONT
CONT    3        4      0.015   0.2                                     CONT
CONT    3        5      0.01    0.1                                     CONT
CONT    0        6      0.02    0.2
$
$    TILE TPS (Based on First of Fig10 of Chiu adn Pitts paper, 1991)
STTYPE  1        1      508                                             CONT
CONT    0.01
STTYPE  2        1      501                                             CONT
CONT    1.0
STTYPE  3        6      245                                             CONT
CONT    0.01
STTYPE  4        1      313                                             CONT
CONT    0.05
STTYPE  5        6      245                                             CONT
CONT    0.01
STTYPE  6        1      103                                             CONT
CONT    0.1
$  AFRSI TPS (Based on Fig7 of Myers report, 2000)
STTYPE  31       6      221                                             CONT
CONT    0.02
STTYPE  32       1      266                                             CONT
CONT    0.02
STTYPE  33       1      260                                             CONT
CONT    1.
STTYPE  34       1      266                                             CONT
CONT    0.15
STTYPE  35       6      245                                             CONT
CONT    0.2
STTYPE  36       1      103                                             CONT
CONT    0.1
$
PRVAL   4               30000000
$
$PATCH  ID      RHSPAN  RHSHOT  LHSPAN  LHSHOT                                  $
PATCH   1        11      12
$
$DESVAR ID      NE      ME
DESVAR  1        6      1                                               CONT
CONT    14      15      16      17      18      19
$       IE1     IE2     IE3     IE4     IE5     IE6     IE7     IE8
PANLST2     11              14      15      16      17      18      19
PANLST2     12              14      15      16      17      18      19
$
$
PATCH   2        21      22
$
$DESVAR ID      NE      ME
DESVAR  2        3      1                                               CONT
CONT     1       6      13                                              CONT
$       IE1     IE2     IE3     IE4     IE5     IE6     IE7     IE8
PANLST2     21              1    THRU      13
PANLST2     22              1      6       13
$
$
PATCH   3        31      32
```

```
$
$DESVAR ID      NE      ME
DESVAR  3        3      1                                                  CONT
CONT     20      26      32
PANLST2     31               20    THRU      32
PANLST2     32               20      26      32
$
$
$TRJLST SETID
TRJLST  1                                                                  CONT
CONT    1       1.
$       TRAJCT  FACT    TRAJCT  FACT    TRAJCT  FACT    TRAJCT  FACT
$
$       TIME    MACH    ALTH    AOA     BETA    FORM    FILE1  FILE1
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
TRAJCT   1        1                                                         CONT
CONT    .00000E0 0.71871.45600E6  4.0000                                   CONT
CONT    .16000E2 0.98944.41990E6 14.0000                                   CONT
CONT    .33000E2 1.34826.43688E6  9.4208                                   CONT
CONT    .49000E2 1.63429.58196E6  3.6000                                   CONT
CONT    .68000E2 2.17754.82141E6  3.6000        TECPLOT CPTEMP1.PLT        CONT
CONT    .88000E2 2.99306.11358E7  3.6000                                   CONT
CONT    .10800E3 4.03065.14897E7  3.6000                                   CONT
CONT    .12800E3 5.30536.18668E7  3.6000                                   CONT
CONT    .14700E3 7.18387.22489E7  8.7000                                   CONT
CONT    .16500E3 8.14718.26307E7 10.2250                                   CONT
CONT    .18500E3 8.48577.29382E7 10.2250                                   CONT
CONT    .20500E3 8.73075.31108E7 10.2250                                   CONT
CONT    .22500E3 8.80061.31479E7 10.2250        TECPLOT CPTEMP2.PLT        CONT
CONT    .24500E3 8.62765.30495E7 10.2250                                   CONT
CONT    .26300E3 8.35804.28476E7 30.0000                                   CONT
CONT    .28300E3 7.92715.25083E7 30.0000                                   CONT
CONT    .30300E3 7.42020.20828E7 30.0000                                   CONT
CONT    .32300E3 6.98630.17006E7 30.0000                                   CONT
CONT    .34100E3 6.51451.15705E7 17.6576                                   CONT
CONT    .35900E3 6.29482.15555E7 11.3822                                   CONT
CONT    .37900E3 6.12626.15505E7 11.5945                                   CONT
CONT    .39900E3 5.96248.15405E7 11.6852                                   CONT
CONT    .41900E3 5.80340.15256E7 11.6316                                   CONT
CONT    .43900E3 5.64886.15063E7 11.4712                                   CONT
CONT    .45900E3 5.49856.14827E7 11.2120                                   CONT
CONT    .47900E3 5.35216.14551E7 10.8676                                   CONT
CONT    .49900E3 5.20938.14237E7 10.4565                                   CONT
CONT    .51900E3 5.06993.13890E7  9.9883                                   CONT
CONT    .53900E3 4.92935.13511E7  9.3991                                   CONT
CONT    .55900E3 4.78106.13103E7  8.7931                                   CONT
CONT    .57900E3 4.62119.12670E7  8.2187                                   CONT
CONT    .59900E3 4.44764.12216E7  7.6847                                   CONT
CONT    .61900E3 4.25902.11747E7  7.2020                                   CONT
CONT    .63900E3 4.05448.11267E7  6.7771                                   CONT
CONT    .65900E3 3.82413.10782E7  6.3472                                   CONT
CONT    .67900E3 3.56631.10300E7  5.9874                                   CONT
CONT    .69900E3 3.28723.98254E6  5.7202                                   CONT
CONT    .71759E3 3.00000.93312E6  4.8191        TECPLOT CPTEMP3.PLT        CONT
CONT    .73600E3 2.68846.87329E6  4.1829                                   CONT
CONT    .75600E3 2.29065.80146E6  3.4982                                   CONT
CONT    .77600E3 1.86649.72891E6  3.0646                                   CONT
CONT    .79600E3 1.47000.66074E6  3.0928                                   CONT
CONT    .81600E3 1.14676.59940E6  3.3054                                   CONT
CONT    .83600E3 0.96665.54315E6  3.8323                                   CONT
CONT    .85600E3 0.86983.48792E6  3.8046                                   CONT
CONT    .87400E3 0.80178.43914E6  3.9110                                   CONT
CONT    .89400E3 0.73186.38870E6  3.9359                                   CONT
CONT    .91400E3 0.67432.34157E6  3.9549                                   CONT
CONT    .93400E3 0.62713.29712E6  3.9492                                   CONT
CONT    .95400E3 0.58784.25488E6  3.9046                                   CONT
CONT    .97400E3 0.55190.21464E6  3.8498                                   CONT
CONT    .99400E3 0.51899.17633E6  3.8233                                   CONT
CONT    .10140E4 0.48941.13984E6  3.8101                                   CONT
CONT    .10340E4 0.46307.10502E6  3.8009                                   CONT
CONT    .10540E4 0.43975.71741E5  3.7895                                   CONT
CONT    .10740E4 0.41915.39891E5  3.7718                                   CONT
CONT    .10940E4 0.40098.93915E4  3.7458
$         TIME     MACH    ALTH    AOA     BETA    P       Q       R
$
$THERMPR|SETID  |TEMP   |HOTWALL|TRANS  |GAS    |EMMS   |       |       |
THERMPR 1        100F
ENDDATA
```

Listing 4.2 Control Table File: CFDTABLE.DAT

```
       A WEDGE PROBLEM WITH 30 DEG OPENING ANGLE
CFDGEO.DAT
       REFC        REFB        REFS        REFX        REFY        REFZ  NO AESURFZ LENGTH UNIT   MASS UNIT
 2.0231E+01  1.0000E+00  1.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00           0          IN         SLIN
      MACH           H       ALPHA        BETA       PRATE       QRATE       RRATE          CD          CY          CL          CR          CM          CN        FILE
 2.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 1.0464E+03 -1.2154E-04 9.9256E+00 -1.9851E+02 -1.3663E+01 2.0929E+04THERM0001
 3.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 8.4591E+02 -3.4213E-04 1.1572E+01 -2.3145E+02 -1.8299E+01 1.6918E+04THERM0002
 4.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 7.4730E+02 -4.1446E-04 1.1469E+01 -2.2938E+02 -1.8067E+01 1.4946E+04THERM0003
 6.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 6.8501E+02 -5.1848E-04 1.1076E+01 -2.2153E+02 -1.7478E+01 1.3700E+04THERM0004
 8.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 6.6359E+02 -5.1988E-04 1.0881E+01 -2.1761E+02 -1.7193E+01 1.3272E+04THERM0005
 1.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 6.5367E+02 -5.1934E-04 1.0780E+01 -2.1560E+02 -1.7049E+01 1.3073E+04THERM0006
 1.2000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 6.4828E+02 -5.6304E-04 1.0737E+01 -2.1475E+02 -1.6966E+01 1.2966E+04THERM0007
 1.4000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 6.4502E+02 -5.6212E-04 1.0705E+01 -2.1410E+02 -1.6917E+01 1.2900E+04THERM0008
 1.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 6.4387E+02 -5.6451E-04 1.0643E+01 -2.1286E+02 -1.6899E+01 1.2878E+04THERM0009
 2.0000E+00  0.0000E+00  2.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 1.0439E+03 -4.8093E-04 6.4793E+01 -1.2960E+03 -5.8482E+01 2.0873E+04THERM0010
 3.0000E+00  0.0000E+00  2.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 8.5863E+02 -4.2905E-04 1.4391E+02 -2.8781E+03 -1.2328E+02 1.7174E+04THERM0011
 4.0000E+00  0.0000E+00  2.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 7.5534E+02 -4.4107E-04 1.1705E+02 -2.3410E+03 -1.0724E+02 1.5105E+04THERM0012
 6.0000E+00  0.0000E+00  2.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 6.9228E+02 -4.5437E-04 1.0932E+02 -2.1863E+03 -1.0111E+02 1.3846E+04THERM0013
 8.0000E+00  0.0000E+00  2.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 6.7082E+02 -4.6100E-04 1.0764E+02 -2.1527E+03 -9.9627E+01 1.3415E+04THERM0014
 1.0000E+01  0.0000E+00  2.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 6.6106E+02 -4.4964E-04 1.0714E+02 -2.1427E+03 -9.9085E+01 1.3221E+04THERM0015
 1.2000E+01  0.0000E+00  2.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 6.5600E+02 -4.5693E-04 1.0690E+02 -2.1380E+03 -9.8859E+01 1.3119E+04THERM0016
 1.4000E+01  0.0000E+00  2.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 6.5331E+02 -4.6469E-04 1.0692E+02 -2.1384E+03 -9.8795E+01 1.3066E+04THERM0017
 1.5000E+01  0.0000E+00  2.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 6.5231E+02 -4.6656E-04 1.0707E+02 -2.1415E+03 -9.8794E+01 1.3045E+04THERM0018
 2.0000E+00  0.0000E+00  4.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 1.0344E+03 -8.5129E-04 1.2535E+02 -2.5070E+03 -1.0488E+02 2.0688E+04THERM0019
 3.0000E+00  0.0000E+00  4.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 9.0106E+02 -6.0923E-04 2.9063E+02 -5.8125E+03 -2.2782E+02 1.8023E+04THERM0020
 4.0000E+00  0.0000E+00  4.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 7.7812E+02 -6.0818E-04 2.2374E+02 -4.4749E+03 -1.9722E+02 1.5562E+04THERM0021
 6.0000E+00  0.0000E+00  4.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 7.1199E+02 -6.3874E-04 2.0713E+02 -4.1425E+03 -1.8479E+02 1.4240E+04THERM0022
 8.0000E+00  0.0000E+00  4.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 6.8998E+02 -6.5148E-04 2.0390E+02 -4.0781E+03 -1.8198E+02 1.3800E+04THERM0023
 1.0000E+01  0.0000E+00  4.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 6.7919E+02 -6.5651E-04 2.0244E+02 -4.0488E+03 -1.8099E+02 1.3584E+04THERM0024
 1.2000E+01  0.0000E+00  4.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 6.7474E+02 -6.6063E-04 2.0243E+02 -4.0486E+03 -1.8054E+02 1.3494E+04THERM0025
 1.4000E+01  0.0000E+00  4.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 6.7111E+02 -6.6273E-04 2.0194E+02 -4.0388E+03 -1.8041E+02 1.3422E+04THERM0026
 1.5000E+01  0.0000E+00  4.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 6.7107E+02 -6.6387E-04 2.0235E+02 -4.0470E+03 -1.8039E+02 1.3421E+04THERM0027
 2.0000E+00  0.0000E+00  6.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 1.0165E+03 -1.0910E-03 2.0025E+02 -4.0051E+03 -1.5651E+02 2.0329E+04THERM0028
 3.0000E+00  0.0000E+00  6.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 9.3070E+02 -9.5714E-04 3.9539E+02 -7.9077E+03 -2.9116E+02 1.8615E+04THERM0029
 4.0000E+00  0.0000E+00  6.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 8.1621E+02 -7.6174E-04 3.3217E+02 -6.6431E+03 -2.8926E+02 1.6327E+04THERM0030
 6.0000E+00  0.0000E+00  6.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 7.4321E+02 -7.9385E-04 3.0316E+02 -6.0632E+03 -2.6864E+02 1.4865E+04THERM0031
 8.0000E+00  0.0000E+00  6.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 7.1934E+02 -8.0817E-04 2.9735E+02 -5.9468E+03 -2.6420E+02 1.4388E+04THERM0032
 1.0000E+01  0.0000E+00  6.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 7.0856E+02 -8.1621E-04 2.9553E+02 -5.9101E+03 -2.6259E+02 1.4176E+04THERM0033
 1.2000E+01  0.0000E+00  6.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 7.0301E+02 -8.2009E-04 2.9476E+02 -5.8947E+03 -2.6189E+02 1.4065E+04THERM0034
 1.4000E+01  0.0000E+00  6.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 6.9991E+02 -8.2188E-04 2.9445E+02 -5.8886E+03 -2.6160E+02 1.4003E+04THERM0035
 1.5000E+01  0.0000E+00  6.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 6.9889E+02 -8.2280E-04 2.9442E+02 -5.8880E+03 -2.6156E+02 1.3981E+04THERM0036
 2.0000E+00  0.0000E+00  8.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 9.9067E+02 -1.1359E-03 3.0145E+02 -6.0290E+03 -2.1923E+02 1.9813E+04THERM0037
 3.0000E+00  0.0000E+00  8.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 9.4881E+02 -1.1461E-03 4.6709E+02 -9.3415E+03 -3.4944E+02 1.8978E+04THERM0038
 4.0000E+00  0.0000E+00  8.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 8.7727E+02 -9.1757E-04 4.5022E+02 -9.0044E+03 -3.8573E+02 1.7545E+04THERM0039
 6.0000E+00  0.0000E+00  8.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 7.8723E+02 -9.4325E-04 3.9784E+02 -7.9567E+03 -3.5294E+02 1.5746E+04THERM0040
 8.0000E+00  0.0000E+00  8.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 7.6176E+02 -9.5864E-04 3.8906E+02 -7.7810E+03 -3.4614E+02 1.5236E+04THERM0041
 1.0000E+01  0.0000E+00  8.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 7.5056E+02 -9.6773E-04 3.8603E+02 -7.7204E+03 -3.4367E+02 1.5014E+04THERM0042
 1.2000E+01  0.0000E+00  8.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 7.4455E+02 -9.7217E-04 3.8472E+02 -7.6943E+03 -3.4256E+02 1.4892E+04THERM0043
 1.4000E+01  0.0000E+00  8.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 7.4130E+02 -9.7454E-04 3.8411E+02 -7.6819E+03 -3.4205E+02 1.4829E+04THERM0044
 1.5000E+01  0.0000E+00  8.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 7.4034E+02 -9.7542E-04 3.8396E+02 -7.6786E+03 -3.4194E+02 1.4811E+04THERM0045
 2.0000E+00  0.0000E+00  1.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 9.7483E+02 -1.1034E-03 3.9256E+02 -7.8512E+03 -2.8576E+02 1.9497E+04THERM0046
 3.0000E+00  0.0000E+00  1.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 9.6750E+02 -1.2098E-03 5.2340E+02 -1.0468E+04 -4.0264E+02 1.9350E+04THERM0047
 4.0000E+00  0.0000E+00  1.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 9.4231E+02 -1.1667E-03 5.5045E+02 -1.1009E+04 -4.4420E+02 1.8846E+04THERM0048
 6.0000E+00  0.0000E+00  1.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 8.4648E+02 -1.0887E-03 4.9227E+02 -9.8455E+03 -4.3877E+02 1.6929E+04THERM0049
 8.0000E+00  0.0000E+00  1.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 8.1659E+02 -1.1046E-03 4.7758E+02 -9.5514E+03 -4.2818E+02 1.6333E+04THERM0050
 1.0000E+01  0.0000E+00  1.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 8.0531E+02 -1.1135E-03 4.7306E+02 -9.4610E+03 -4.2431E+02 1.6107E+04THERM0051
 1.2000E+01  0.0000E+00  1.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 7.9874E+02 -1.1187E-03 4.7080E+02 -9.4159E+03 -4.2253E+02 1.5975E+04THERM0052
 1.4000E+01  0.0000E+00  1.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 7.9368E+02 -1.1217E-03 4.6913E+02 -9.3822E+03 -4.2169E+02 1.5875E+04THERM0053
 1.5000E+01  0.0000E+00  1.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 7.9249E+02 -1.1228E-03 4.6882E+02 -9.3761E+03 -4.2146E+02 1.5852E+04THERM0054
 2.0000E+00  0.0000E+00  1.1000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 9.7191E+02 -1.0730E-03 4.2989E+02 -8.5977E+03 -3.1738E+02 1.9438E+04THERM0055
 3.0000E+00  0.0000E+00  1.1000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 9.7732E+02 -1.2093E-03 5.4668E+02 -1.0934E+04 -4.2722E+02 1.9546E+04THERM0056
 4.0000E+00  0.0000E+00  1.1000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 9.6073E+02 -1.2464E-03 5.7757E+02 -1.1551E+04 -4.6631E+02 1.9214E+04THERM0057
 6.0000E+00  0.0000E+00  1.1000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 8.8427E+02 -1.1590E-03 5.4156E+02 -1.0831E+04 -4.8317E+02 1.7686E+04THERM0058
 8.0000E+00  0.0000E+00  1.1000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 8.4996E+02 -1.1743E-03 5.2153E+02 -1.0431E+04 -4.6963E+02 1.7000E+04THERM0059
 1.0000E+01  0.0000E+00  1.1000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 8.3732E+02 -1.1827E-03 5.1538E+02 -1.0308E+04 -4.6469E+02 1.6746E+04THERM0060
 1.2000E+01  0.0000E+00  1.1000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00 8.2874E+02 -1.1882E-03 5.1180E+02 -1.0236E+04 -4.6241E+02 1.6575E+04THERM0061
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1.4000E+01  0.0000E+00  1.1000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  8.2448E+02 -1.1912E-03  5.1014E+02 -1.0203E+04 -4.6114E+02  1.6489E+04THERM0062
1.5000E+01  0.0000E+00  1.1000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  8.2307E+02 -1.1923E-03  5.0959E+02 -1.0192E+04 -4.6073E+02  1.6461E+04THERM0063
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3.0000E+00  0.0000E+00  1.2000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  9.8809E+02 -1.1914E-03  5.6729E+02 -1.1346E+04 -4.5034E+02  1.9762E+04THERM0065
4.0000E+00  0.0000E+00  1.2000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  9.7752E+02 -1.2833E-03  5.9973E+02 -1.1995E+04 -4.8818E+02  1.9550E+04THERM0066
6.0000E+00  0.0000E+00  1.2000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  9.3097E+02 -1.2280E-03  5.9554E+02 -1.1911E+04 -5.2844E+02  1.8620E+04THERM0067
8.0000E+00  0.0000E+00  1.2000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  8.8830E+02 -1.2412E-03  5.6621E+02 -1.1324E+04 -5.1183E+02  1.7767E+04THERM0068
1.0000E+01  0.0000E+00  1.2000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  8.7231E+02 -1.2491E-03  5.5714E+02 -1.1143E+04 -5.0553E+02  1.7447E+04THERM0069
1.2000E+01  0.0000E+00  1.2000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  8.6561E+02 -1.2547E-03  5.5351E+02 -1.1070E+04 -5.0249E+02  1.7311E+04THERM0070
1.4000E+01  0.0000E+00  1.2000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  8.5954E+02 -1.2580E-03  5.5076E+02 -1.1015E+04 -5.0087E+02  1.7190E+04THERM0071
1.5000E+01  0.0000E+00  1.2000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  8.5792E+02 -1.2592E-03  5.5003E+02 -1.1001E+04 -5.0033E+02  1.7157E+04THERM0072
2.0000E+00  0.0000E+00  1.3000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  9.7275E+02 -9.7912E-04  4.9409E+02 -9.8818E+03 -3.7664E+02  1.9455E+04THERM0073
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4.0000E+00  0.0000E+00  1.3000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  9.9426E+02 -1.2862E-03  6.1766E+02 -1.2353E+04 -5.0860E+02  1.9885E+04THERM0075
6.0000E+00  0.0000E+00  1.3000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  9.7491E+02 -1.3182E-03  6.3808E+02 -1.2762E+04 -5.4610E+02  1.9498E+04THERM0076
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1.0000E+01  0.0000E+00  1.3000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  9.1554E+02 -1.3125E-03  6.0096E+02 -1.2019E+04 -5.4718E+02  1.8310E+04THERM0078
1.2000E+01  0.0000E+00  1.3000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  9.0475E+02 -1.3176E-03  5.9452E+02 -1.1891E+04 -5.4330E+02  1.8094E+04THERM0079
1.4000E+01  0.0000E+00  1.3000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  8.9931E+02 -1.3211E-03  5.9138E+02 -1.1828E+04 -5.4112E+02  1.7985E+04THERM0080
1.5000E+01  0.0000E+00  1.3000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  8.9745E+02 -1.3224E-03  5.9036E+02 -1.1807E+04 -5.4041E+02  1.7950E+04THERM0081
2.0000E+00  0.0000E+00  1.4000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  9.7582E+02 -9.1516E-04  5.2236E+02 -1.0447E+04 -4.0488E+02  1.9516E+04THERM0082
3.0000E+00  0.0000E+00  1.4000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0112E+03 -1.1120E-03  6.0138E+02 -1.2028E+04 -4.9295E+02  2.0224E+04THERM0083
4.0000E+00  0.0000E+00  1.4000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0110E+03 -1.2624E-03  6.3218E+02 -1.2644E+04 -5.2786E+02  2.0220E+04THERM0084
6.0000E+00  0.0000E+00  1.4000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  9.9864E+02 -1.3652E-03  6.5513E+02 -1.3103E+04 -5.5974E+02  1.9972E+04THERM0085
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1.2000E+01  0.0000E+00  1.4000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  9.5357E+02 -1.3766E-03  6.3963E+02 -1.2793E+04 -5.8531E+02  1.9071E+04THERM0088
1.4000E+01  0.0000E+00  1.4000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  9.4659E+02 -1.3799E-03  6.3483E+02 -1.2697E+04 -5.8250E+02  1.8931E+04THERM0089
1.5000E+01  0.0000E+00  1.4000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  9.4426E+02 -1.3812E-03  6.3324E+02 -1.2665E+04 -5.8151E+02  1.8885E+04THERM0090
2.0000E+00  0.0000E+00  1.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  9.8007E+02 -8.3763E-04  5.4865E+02 -1.0973E+04 -4.3207E+02  1.9602E+04THERM0091
3.0000E+00  0.0000E+00  1.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0230E+03 -1.0507E-03  6.1607E+02 -1.2320E+04 -5.1269E+02  2.0465E+04THERM0092
4.0000E+00  0.0000E+00  1.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0266E+03 -1.2174E-03  6.4498E+02 -1.2898E+04 -5.4581E+02  2.0539E+04THERM0093
6.0000E+00  0.0000E+00  1.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0196E+03 -1.3678E-03  6.6833E+02 -1.3365E+04 -5.7489E+02  2.0400E+04THERM0094
8.0000E+00  0.0000E+00  1.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0146E+03 -1.4086E-03  6.7621E+02 -1.3522E+04 -5.8976E+02  2.0301E+04THERM0095
1.0000E+01  0.0000E+00  1.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0105E+03 -1.4255E-03  6.8101E+02 -1.3618E+04 -6.0052E+02  2.0219E+04THERM0096
1.2000E+01  0.0000E+00  1.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0077E+03 -1.4286E-03  6.8482E+02 -1.3693E+04 -6.1007E+02  2.0167E+04THERM0097
1.4000E+01  0.0000E+00  1.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0041E+03 -1.4346E-03  6.8450E+02 -1.3687E+04 -6.1907E+02  2.0094E+04THERM0098
1.5000E+01  0.0000E+00  1.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0010E+03 -1.4357E-03  6.8243E+02 -1.3645E+04 -6.2033E+02  2.0034E+04THERM0099
2.0000E+00  0.0000E+00  1.6000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  9.8629E+02 -7.4441E-04  5.7252E+02 -1.1450E+04 -4.5824E+02  1.9728E+04THERM0100
3.0000E+00  0.0000E+00  1.6000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0365E+03 -9.7384E-04  6.2763E+02 -1.2553E+04 -5.3159E+02  2.0731E+04THERM0101
4.0000E+00  0.0000E+00  1.6000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0435E+03 -1.1541E-03  6.5365E+02 -1.3073E+04 -5.6271E+02  2.0870E+04THERM0102
6.0000E+00  0.0000E+00  1.6000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0404E+03 -1.3352E-03  6.7586E+02 -1.3517E+04 -5.8955E+02  2.0808E+04THERM0103
8.0000E+00  0.0000E+00  1.6000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0369E+03 -1.3990E-03  6.8445E+02 -1.3689E+04 -6.0177E+02  2.0738E+04THERM0104
1.0000E+01  0.0000E+00  1.6000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0342E+03 -1.4262E-03  6.8909E+02 -1.3782E+04 -6.0883E+02  2.0684E+04THERM0105
1.2000E+01  0.0000E+00  1.6000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0329E+03 -1.4419E-03  6.9137E+02 -1.3828E+04 -6.1345E+02  2.0658E+04THERM0106
1.4000E+01  0.0000E+00  1.6000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0329E+03 -1.4516E-03  6.9411E+02 -1.3882E+04 -6.1673E+02  2.0658E+04THERM0107
1.5000E+01  0.0000E+00  1.6000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0326E+03 -1.4555E-03  6.9479E+02 -1.3896E+04 -6.1803E+02  2.0652E+04THERM0108
2.0000E+00  0.0000E+00  1.7000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  9.9471E+02 -6.3279E-04  5.9379E+02 -1.1876E+04 -4.8338E+02  1.9895E+04THERM0109
3.0000E+00  0.0000E+00  1.7000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0498E+03 -8.7932E-04  6.3813E+02 -1.2763E+04 -5.4970E+02  2.0995E+04THERM0110
4.0000E+00  0.0000E+00  1.7000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0599E+03 -1.0733E-03  6.6104E+02 -1.3221E+04 -5.7862E+02  2.1198E+04THERM0111
6.0000E+00  0.0000E+00  1.7000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0604E+03 -1.2728E-03  6.8147E+02 -1.3629E+04 -6.0336E+02  2.1209E+04THERM0112
8.0000E+00  0.0000E+00  1.7000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0585E+03 -1.3550E-03  6.8971E+02 -1.3794E+04 -6.1403E+02  2.1169E+04THERM0113
1.0000E+01  0.0000E+00  1.7000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0569E+03 -1.3924E-03  6.9396E+02 -1.3879E+04 -6.1972E+02  2.1137E+04THERM0114
1.2000E+01  0.0000E+00  1.7000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0560E+03 -1.4123E-03  6.9633E+02 -1.3927E+04 -6.2317E+02  2.1119E+04THERM0115
1.4000E+01  0.0000E+00  1.7000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0554E+03 -1.4240E-03  6.9790E+02 -1.3958E+04 -6.2542E+02  2.1107E+04THERM0116
1.5000E+01  0.0000E+00  1.7000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0552E+03 -1.4285E-03  6.9849E+02 -1.3970E+04 -6.2627E+02  2.1102E+04THERM0117
2.0000E+00  0.0000E+00  1.8000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0034E+03 -4.9913E-04  6.1339E+02 -1.2268E+04 -5.0753E+02  2.0068E+04THERM0118
3.0000E+00  0.0000E+00  1.8000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0633E+03 -7.6415E-04  6.4719E+02 -1.2944E+04 -5.6713E+02  2.1266E+04THERM0119
4.0000E+00  0.0000E+00  1.8000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0767E+03 -9.7329E-04  6.6631E+02 -1.3326E+04 -5.9373E+02  2.1532E+04THERM0120
6.0000E+00  0.0000E+00  1.8000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0798E+03 -1.1868E-03  6.8478E+02 -1.3696E+04 -6.1639E+02  2.1596E+04THERM0121
8.0000E+00  0.0000E+00  1.8000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0793E+03 -1.2790E-03  6.9237E+02 -1.3848E+04 -6.2581E+02  2.1584E+04THERM0122
1.0000E+01  0.0000E+00  1.8000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0786E+03 -1.3244E-03  6.9586E+02 -1.3918E+04 -6.3068E+02  2.1571E+04THERM0123
1.2000E+01  0.0000E+00  1.8000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0783E+03 -1.3495E-03  6.9786E+02 -1.3957E+04 -6.3354E+02  2.1565E+04THERM0124
1.4000E+01  0.0000E+00  1.8000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0781E+03 -1.3646E-03  6.9912E+02 -1.3983E+04 -6.3538E+02  2.1562E+04THERM0125
1.5000E+01  0.0000E+00  1.8000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0781E+03 -1.3701E-03  6.9966E+02 -1.3994E+04 -6.3607E+02  2.1560E+04THERM0126
2.0000E+00  0.0000E+00  1.9000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0130E+03 -3.3799E-04  6.3098E+02 -1.2620E+04 -5.3072E+02  2.0260E+04THERM0127
3.0000E+00  0.0000E+00  1.9000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0775E+03 -6.2415E-04  6.5443E+02 -1.3089E+04 -5.8396E+02  2.1551E+04THERM0128
4.0000E+00  0.0000E+00  1.9000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0930E+03 -8.5120E-04  6.7034E+02 -1.3407E+04 -6.0816E+02  2.1860E+04THERM0129
```

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6.0000E+00  0.0000E+00  1.9000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0991E+03 -1.0791E-03  6.8589E+02 -1.3718E+04 -6.2874E+02  2.1983E+04THERM0130
8.0000E+00  0.0000E+00  1.9000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1000E+03 -1.1775E-03  6.9230E+02 -1.3846E+04 -6.3712E+02  2.1999E+04THERM0131
1.0000E+01  0.0000E+00  1.9000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1001E+03 -1.2271E-03  6.9543E+02 -1.3909E+04 -6.4131E+02  2.2002E+04THERM0132
1.2000E+01  0.0000E+00  1.9000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0999E+03 -1.2551E-03  6.9740E+02 -1.3949E+04 -6.4374E+02  2.1996E+04THERM0133
1.4000E+01  0.0000E+00  1.9000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1001E+03 -1.2723E-03  6.9830E+02 -1.3967E+04 -6.4528E+02  2.2001E+04THERM0134
1.5000E+01  0.0000E+00  1.9000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1001E+03 -1.2786E-03  6.9879E+02 -1.3976E+04 -6.4587E+02  2.2001E+04THERM0135
2.0000E+00  0.0000E+00  2.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0239E+03 -1.4266E-04  6.4648E+02 -1.2930E+04 -5.5296E+02  2.0478E+04THERM0136
3.0000E+00  0.0000E+00  2.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0917E+03 -4.5389E-04  6.6071E+02 -1.3214E+04 -6.0023E+02  2.1834E+04THERM0137
4.0000E+00  0.0000E+00  2.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1095E+03 -7.0237E-04  6.7274E+02 -1.3455E+04 -6.2204E+02  2.2190E+04THERM0138
6.0000E+00  0.0000E+00  2.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1182E+03 -9.4793E-04  6.8502E+02 -1.3700E+04 -6.4057E+02  2.2365E+04THERM0139
8.0000E+00  0.0000E+00  2.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1199E+03 -1.0522E-03  6.9046E+02 -1.3810E+04 -6.4796E+02  2.2396E+04THERM0140
1.0000E+01  0.0000E+00  2.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1204E+03 -1.1047E-03  6.9324E+02 -1.3866E+04 -6.5161E+02  2.2406E+04THERM0141
1.2000E+01  0.0000E+00  2.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1209E+03 -1.1345E-03  6.9457E+02 -1.3891E+04 -6.5371E+02  2.2418E+04THERM0142
1.4000E+01  0.0000E+00  2.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1211E+03 -1.1529E-03  6.9561E+02 -1.3912E+04 -6.5502E+02  2.2421E+04THERM0143
1.5000E+01  0.0000E+00  2.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1211E+03 -1.1596E-03  6.9602E+02 -1.3921E+04 -6.5552E+02  2.2421E+04THERM0144
2.0000E+00  0.0000E+00  2.1000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0356E+03  9.7463E-05  6.6020E+02 -1.3204E+04 -5.7430E+02  2.0713E+04THERM0145
3.0000E+00  0.0000E+00  2.1000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1063E+03 -2.4425E-04  6.6539E+02 -1.3308E+04 -6.1600E+02  2.2127E+04THERM0146
4.0000E+00  0.0000E+00  2.1000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1261E+03 -5.2135E-04  6.7369E+02 -1.3474E+04 -6.3545E+02  2.2523E+04THERM0147
6.0000E+00  0.0000E+00  2.1000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1367E+03 -7.8865E-04  6.8296E+02 -1.3661E+04 -6.5194E+02  2.2731E+04THERM0148
8.0000E+00  0.0000E+00  2.1000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1394E+03 -9.0053E-04  6.8730E+02 -1.3747E+04 -6.5844E+02  2.2787E+04THERM0149
1.0000E+01  0.0000E+00  2.1000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1403E+03 -9.5631E-04  6.8919E+02 -1.3785E+04 -6.6162E+02  2.2803E+04THERM0150
1.2000E+01  0.0000E+00  2.1000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1407E+03 -9.8782E-04  6.9049E+02 -1.3811E+04 -6.6340E+02  2.2812E+04THERM0151
1.4000E+01  0.0000E+00  2.1000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1409E+03 -1.0072E-03  6.9139E+02 -1.3829E+04 -6.6455E+02  2.2814E+04THERM0152
1.5000E+01  0.0000E+00  2.1000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1413E+03 -1.0143E-03  6.9165E+02 -1.3833E+04 -6.6498E+02  2.2825E+04THERM0153
2.0000E+00  0.0000E+00  2.2000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0477E+03  3.9014E-04  6.7244E+02 -1.3449E+04 -5.9476E+02  2.0954E+04THERM0154
3.0000E+00  0.0000E+00  2.2000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1213E+03  1.4468E-05  6.6878E+02 -1.3375E+04 -6.3127E+02  2.2426E+04THERM0155
4.0000E+00  0.0000E+00  2.2000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1426E+03 -2.9846E-04  6.7345E+02 -1.3469E+04 -6.4843E+02  2.2852E+04THERM0156
6.0000E+00  0.0000E+00  2.2000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1553E+03 -5.9526E-04  6.7935E+02 -1.3587E+04 -6.6296E+02  2.3106E+04THERM0157
8.0000E+00  0.0000E+00  2.2000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1587E+03 -7.1661E-04  6.8254E+02 -1.3651E+04 -6.6863E+02  2.3174E+04THERM0158
1.0000E+01  0.0000E+00  2.2000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1599E+03 -7.7673E-04  6.8424E+02 -1.3686E+04 -6.7135E+02  2.3197E+04THERM0159
1.2000E+01  0.0000E+00  2.2000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1605E+03 -8.1058E-04  6.8527E+02 -1.3707E+04 -6.7288E+02  2.3207E+04THERM0160
1.4000E+01  0.0000E+00  2.2000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1611E+03 -8.3132E-04  6.8587E+02 -1.3718E+04 -6.7386E+02  2.3221E+04THERM0161
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2.0000E+00  0.0000E+00  2.3000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0610E+03  4.7185E-04  6.8253E+02 -1.3650E+04 -6.1437E+02  2.1221E+04THERM0163
3.0000E+00  0.0000E+00  2.3000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1361E+03  3.2321E-04  6.7102E+02 -1.3420E+04 -6.4606E+02  2.2723E+04THERM0164
4.0000E+00  0.0000E+00  2.3000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1595E+03 -2.1769E-05  6.7156E+02 -1.3431E+04 -6.6106E+02  2.3190E+04THERM0165
6.0000E+00  0.0000E+00  2.3000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1731E+03 -3.5897E-04  6.7515E+02 -1.3503E+04 -6.7368E+02  2.3462E+04THERM0166
8.0000E+00  0.0000E+00  2.3000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1771E+03 -4.9395E-04  6.7728E+02 -1.3545E+04 -6.7856E+02  2.3542E+04THERM0167
1.0000E+01  0.0000E+00  2.3000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1788E+03 -5.5961E-04  6.7835E+02 -1.3567E+04 -6.8089E+02  2.3575E+04THERM0168
1.2000E+01  0.0000E+00  2.3000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1796E+03 -5.9640E-04  6.7903E+02 -1.3580E+04 -6.8219E+02  2.3593E+04THERM0169
1.4000E+01  0.0000E+00  2.3000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1799E+03 -6.1888E-04  6.7964E+02 -1.3596E+04 -6.8302E+02  2.3589E+04THERM0170
1.5000E+01  0.0000E+00  2.3000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1804E+03 -6.2698E-04  6.7970E+02 -1.3594E+04 -6.8334E+02  2.3610E+04THERM0171
2.0000E+00  0.0000E+00  2.4000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0742E+03  6.9263E-05  6.9147E+02 -1.3830E+04 -6.3316E+02  2.1484E+04THERM0172
3.0000E+00  0.0000E+00  2.4000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1516E+03  2.8734E-04  6.7166E+02 -1.3433E+04 -6.6038E+02  2.3034E+04THERM0173
4.0000E+00  0.0000E+00  2.4000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1755E+03  2.9040E-04  6.6951E+02 -1.3390E+04 -6.7331E+02  2.3512E+04THERM0174
6.0000E+00  0.0000E+00  2.4000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1905E+03 -6.5154E-05  6.7024E+02 -1.3404E+04 -6.8414E+02  2.3812E+04THERM0175
8.0000E+00  0.0000E+00  2.4000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1951E+03 -2.1879E-04  6.7102E+02 -1.3420E+04 -6.8829E+02  2.3901E+04THERM0176
1.0000E+01  0.0000E+00  2.4000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1970E+03 -2.9324E-04  6.7162E+02 -1.3433E+04 -6.9025E+02  2.3938E+04THERM0177
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1.4000E+01  0.0000E+00  2.4000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1988E+03 -3.6015E-04  6.7218E+02 -1.3443E+04 -6.9204E+02  2.3976E+04THERM0179
1.5000E+01  0.0000E+00  2.4000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1991E+03 -3.6923E-04  6.7229E+02 -1.3446E+04 -6.9231E+02  2.3981E+04THERM0180
2.0000E+00  0.0000E+00  2.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.0883E+03 -4.2416E-04  6.9856E+02 -1.3971E+04 -6.5116E+02  2.1766E+04THERM0181
3.0000E+00  0.0000E+00  2.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1667E+03 -2.2441E-04  6.7153E+02 -1.3430E+04 -6.7424E+02  2.3335E+04THERM0182
4.0000E+00  0.0000E+00  2.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1916E+03  1.4193E-04  6.6610E+02 -1.3321E+04 -6.8524E+02  2.3834E+04THERM0183
6.0000E+00  0.0000E+00  2.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2078E+03  2.4604E-04  6.6403E+02 -1.3282E+04 -6.9439E+02  2.4154E+04THERM0184
8.0000E+00  0.0000E+00  2.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2130E+03  1.1904E-04  6.6370E+02 -1.3274E+04 -6.9785E+02  2.4260E+04THERM0185
1.0000E+01  0.0000E+00  2.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2150E+03  3.7606E-05  6.6384E+02 -1.3278E+04 -6.9947E+02  2.4299E+04THERM0186
1.2000E+01  0.0000E+00  2.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2162E+03 -1.0002E-05  6.6396E+02 -1.3278E+04 -7.0037E+02  2.4325E+04THERM0187
1.4000E+01  0.0000E+00  2.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2170E+03 -3.9470E-05  6.6406E+02 -1.3282E+04 -7.0095E+02  2.4338E+04THERM0188
1.5000E+01  0.0000E+00  2.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2172E+03 -5.0107E-05  6.6417E+02 -1.3282E+04 -7.0118E+02  2.4346E+04THERM0189
2.0000E+00  0.0000E+00  2.6000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1024E+03 -7.9527E-04  7.0447E+02 -1.4089E+04 -6.6842E+02  2.2048E+04THERM0190
3.0000E+00  0.0000E+00  2.6000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1817E+03 -6.7678E-04  6.7028E+02 -1.3405E+04 -6.8763E+02  2.3636E+04THERM0191
4.0000E+00  0.0000E+00  2.6000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2076E+03 -3.9915E-04  6.6170E+02 -1.3234E+04 -6.9685E+02  2.4153E+04THERM0192
6.0000E+00  0.0000E+00  2.6000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2246E+03  3.1916E-06  6.5702E+02 -1.3142E+04 -7.0444E+02  2.4489E+04THERM0193
8.0000E+00  0.0000E+00  2.6000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2301E+03  1.5261E-04  6.5594E+02 -1.3117E+04 -7.0724E+02  2.4604E+04THERM0194
1.0000E+01  0.0000E+00  2.6000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2326E+03  1.9496E-04  6.5528E+02 -1.3107E+04 -7.0857E+02  2.4648E+04THERM0195
1.2000E+01  0.0000E+00  2.6000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2338E+03  2.0492E-04  6.5512E+02 -1.3101E+04 -7.0928E+02  2.4680E+04THERM0196
1.4000E+01  0.0000E+00  2.6000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2345E+03  2.0549E-04  6.5513E+02 -1.3105E+04 -7.0975E+02  2.4685E+04THERM0197
```

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1.5000E+01  0.0000E+00  2.6000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2349E+03  2.0458E-04  6.5510E+02 -1.3100E+04 -7.0994E+02  2.4703E+04THERM0198
2.0000E+00  0.0000E+00  2.7000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1171E+03 -1.0600E-03  7.0868E+02 -1.4173E+04 -6.8496E+02  2.2343E+04THERM0199
3.0000E+00  0.0000E+00  2.7000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1970E+03 -9.8750E-04  6.6780E+02 -1.3355E+04 -7.0057E+02  2.3942E+04THERM0200
4.0000E+00  0.0000E+00  2.7000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2234E+03 -8.1348E-04  6.5640E+02 -1.3128E+04 -7.0814E+02  2.4468E+04THERM0201
6.0000E+00  0.0000E+00  2.7000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2412E+03 -5.3812E-04  6.4922E+02 -1.2986E+04 -7.1428E+02  2.4820E+04THERM0202
8.0000E+00  0.0000E+00  2.7000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2468E+03 -3.8309E-04  6.4721E+02 -1.2943E+04 -7.1650E+02  2.4940E+04THERM0203
1.0000E+01  0.0000E+00  2.7000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2494E+03 -2.9756E-04  6.4632E+02 -1.2928E+04 -7.1753E+02  2.4985E+04THERM0204
1.2000E+01  0.0000E+00  2.7000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2507E+03 -2.4782E-04  6.4592E+02 -1.2917E+04 -7.1809E+02  2.5017E+04THERM0205
1.4000E+01  0.0000E+00  2.7000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2518E+03 -2.1701E-04  6.4542E+02 -1.2910E+04 -7.1847E+02  2.5033E+04THERM0206
1.5000E+01  0.0000E+00  2.7000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2520E+03 -2.0594E-04  6.4543E+02 -1.2907E+04 -7.1862E+02  2.5044E+04THERM0207
2.0000E+00  0.0000E+00  2.8000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1324E+03 -1.2494E-03  7.1131E+02 -1.4226E+04 -7.0082E+02  2.2648E+04THERM0208
3.0000E+00  0.0000E+00  2.8000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2122E+03 -1.1993E-03  6.6423E+02 -1.3284E+04 -7.1307E+02  2.4245E+04THERM0209
4.0000E+00  0.0000E+00  2.8000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2391E+03 -1.0892E-03  6.5004E+02 -1.3000E+04 -7.1910E+02  2.4783E+04THERM0210
6.0000E+00  0.0000E+00  2.8000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2574E+03 -9.1964E-04  6.4060E+02 -1.2814E+04 -7.2392E+02  2.5143E+04THERM0211
8.0000E+00  0.0000E+00  2.8000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2633E+03 -8.2417E-04  6.3768E+02 -1.2751E+04 -7.2561E+02  2.5271E+04THERM0212
1.0000E+01  0.0000E+00  2.8000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2658E+03 -7.7014E-04  6.3647E+02 -1.2734E+04 -7.2637E+02  2.5309E+04THERM0213
1.2000E+01  0.0000E+00  2.8000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2674E+03 -7.3792E-04  6.3573E+02 -1.2712E+04 -7.2678E+02  2.5353E+04THERM0214
1.4000E+01  0.0000E+00  2.8000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2683E+03 -7.1747E-04  6.3535E+02 -1.2710E+04 -7.2706E+02  2.5361E+04THERM0215
1.5000E+01  0.0000E+00  2.8000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2686E+03 -7.1008E-04  6.3529E+02 -1.2703E+04 -7.2718E+02  2.5377E+04THERM0216
2.0000E+00  0.0000E+00  2.9000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1477E+03 -1.3781E-03  7.1270E+02 -1.4253E+04 -7.1603E+02  2.2955E+04THERM0217
3.0000E+00  0.0000E+00  2.9000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2275E+03 -1.3368E-03  6.5947E+02 -1.3189E+04 -7.2512E+02  2.4549E+04THERM0218
4.0000E+00  0.0000E+00  2.9000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2548E+03 -1.2705E-03  6.4237E+02 -1.2848E+04 -7.2975E+02  2.5096E+04THERM0219
6.0000E+00  0.0000E+00  2.9000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2733E+03 -1.1675E-03  6.3127E+02 -1.2623E+04 -7.3334E+02  2.5470E+04THERM0220
8.0000E+00  0.0000E+00  2.9000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2795E+03 -1.1097E-03  6.2735E+02 -1.2550E+04 -7.3454E+02  2.5585E+04THERM0221
1.0000E+01  0.0000E+00  2.9000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2822E+03 -1.0772E-03  6.2569E+02 -1.2512E+04 -7.3507E+02  2.5647E+04THERM0222
1.2000E+01  0.0000E+00  2.9000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2837E+03 -1.0579E-03  6.2478E+02 -1.2497E+04 -7.3534E+02  2.5671E+04THERM0223
1.4000E+01  0.0000E+00  2.9000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2845E+03 -1.0458E-03  6.2437E+02 -1.2485E+04 -7.3553E+02  2.5694E+04THERM0224
1.5000E+01  0.0000E+00  2.9000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2849E+03 -1.0415E-03  6.2419E+02 -1.2486E+04 -7.3562E+02  2.5693E+04THERM0225
2.0000E+00  0.0000E+00  3.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1631E+03 -1.4408E-03  7.1277E+02 -1.4255E+04 -7.3061E+02  2.3262E+04THERM0226
3.0000E+00  0.0000E+00  3.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2426E+03 -1.3960E-03  6.5359E+02 -1.3071E+04 -7.3673E+02  2.4853E+04THERM0227
4.0000E+00  0.0000E+00  3.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2700E+03 -1.3725E-03  6.3431E+02 -1.2685E+04 -7.4007E+02  2.5403E+04THERM0228
6.0000E+00  0.0000E+00  3.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2889E+03 -1.3224E-03  6.2091E+02 -1.2421E+04 -7.4255E+02  2.5775E+04THERM0229
8.0000E+00  0.0000E+00  3.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2953E+03 -1.2905E-03  6.1620E+02 -1.2321E+04 -7.4331E+02  2.5912E+04THERM0230
1.0000E+01  0.0000E+00  3.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2980E+03 -1.2720E-03  6.1422E+02 -1.2289E+04 -7.4361E+02  2.5952E+04THERM0231
1.2000E+01  0.0000E+00  3.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2996E+03 -1.2610E-03  6.1308E+02 -1.2258E+04 -7.4376E+02  2.5999E+04THERM0232
1.4000E+01  0.0000E+00  3.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3005E+03 -1.2543E-03  6.1250E+02 -1.2254E+04 -7.4388E+02  2.6002E+04THERM0233
1.5000E+01  0.0000E+00  3.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3010E+03 -1.2519E-03  6.1226E+02 -1.2242E+04 -7.4395E+02  2.6026E+04THERM0234
2.0000E+00  0.0000E+00  3.1000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1788E+03 -1.4200E-03  7.1144E+02 -1.4228E+04 -7.4460E+02  2.3577E+04THERM0235
3.0000E+00  0.0000E+00  3.1000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2578E+03 -1.3585E-03  6.4655E+02 -1.2931E+04 -7.4793E+02  2.5155E+04THERM0236
4.0000E+00  0.0000E+00  3.1000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2853E+03 -1.3771E-03  6.2490E+02 -1.2499E+04 -7.5008E+02  2.5705E+04THERM0237
6.0000E+00  0.0000E+00  3.1000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3044E+03 -1.3870E-03  6.0963E+02 -1.2189E+04 -7.5154E+02  2.6093E+04THERM0238
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1.0000E+01  0.0000E+00  3.1000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3137E+03 -1.3764E-03  6.0183E+02 -1.2033E+04 -7.5200E+02  2.6279E+04THERM0240
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1.4000E+01  0.0000E+00  3.1000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3163E+03 -1.3707E-03  5.9956E+02 -1.1988E+04 -7.5210E+02  2.6333E+04THERM0242
1.5000E+01  0.0000E+00  3.1000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3167E+03 -1.3701E-03  5.9938E+02 -1.1992E+04 -7.5214E+02  2.6326E+04THERM0243
2.0000E+00  0.0000E+00  3.2000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1945E+03 -1.3353E-03  7.0879E+02 -1.4177E+04 -7.5799E+02  2.3890E+04THERM0244
3.0000E+00  0.0000E+00  3.2000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2728E+03 -1.2636E-03  6.3840E+02 -1.2768E+04 -7.5870E+02  2.5456E+04THERM0245
4.0000E+00  0.0000E+00  3.2000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3003E+03 -1.2924E-03  6.1456E+02 -1.2289E+04 -7.5976E+02  2.6009E+04THERM0246
6.0000E+00  0.0000E+00  3.2000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3196E+03 -1.3416E-03  5.9745E+02 -1.1952E+04 -7.6031E+02  2.6387E+04THERM0247
8.0000E+00  0.0000E+00  3.2000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3259E+03 -1.3626E-03  5.9164E+02 -1.1829E+04 -7.6031E+02  2.6524E+04THERM0248
1.0000E+01  0.0000E+00  3.2000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3287E+03 -1.3720E-03  5.8901E+02 -1.1783E+04 -7.6023E+02  2.6569E+04THERM0249
1.2000E+01  0.0000E+00  3.2000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3305E+03 -1.3772E-03  5.8704E+02 -1.1738E+04 -7.6018E+02  2.6615E+04THERM0250
1.4000E+01  0.0000E+00  3.2000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3315E+03 -1.3805E-03  5.8623E+02 -1.1728E+04 -7.6017E+02  2.6625E+04THERM0251
1.5000E+01  0.0000E+00  3.2000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3319E+03 -1.3818E-03  5.8596E+02 -1.1716E+04 -7.6019E+02  2.6643E+04THERM0252
2.0000E+00  0.0000E+00  3.3000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2105E+03 -1.2489E-03  7.0483E+02 -1.4094E+04 -7.7083E+02  2.4213E+04THERM0253
3.0000E+00  0.0000E+00  3.3000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2876E+03 -1.1860E-03  6.2926E+02 -1.2585E+04 -7.6906E+02  2.5753E+04THERM0254
4.0000E+00  0.0000E+00  3.3000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3151E+03 -1.2014E-03  6.0325E+02 -1.2067E+04 -7.6912E+02  2.6298E+04THERM0255
6.0000E+00  0.0000E+00  3.3000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3343E+03 -1.2403E-03  5.8453E+02 -1.1688E+04 -7.6887E+02  2.6691E+04THERM0256
8.0000E+00  0.0000E+00  3.3000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3407E+03 -1.2637E-03  5.7810E+02 -1.1567E+04 -7.6853E+02  2.6806E+04THERM0257
1.0000E+01  0.0000E+00  3.3000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3436E+03 -1.2770E-03  5.7506E+02 -1.1497E+04 -7.6829E+02  2.6879E+04THERM0258
1.2000E+01  0.0000E+00  3.3000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3452E+03 -1.2848E-03  5.7344E+02 -1.1473E+04 -7.6814E+02  2.6899E+04THERM0259
1.4000E+01  0.0000E+00  3.3000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3462E+03 -1.2901E-03  5.7251E+02 -1.1446E+04 -7.6808E+02  2.6930E+04THERM0260
1.5000E+01  0.0000E+00  3.3000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3466E+03 -1.2922E-03  5.7221E+02 -1.1448E+04 -7.6808E+02  2.6927E+04THERM0261
2.0000E+00  0.0000E+00  3.4000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2260E+03 -1.1948E-03  6.9987E+02 -1.3997E+04 -7.8313E+02  2.4521E+04THERM0262
3.0000E+00  0.0000E+00  3.4000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3023E+03 -1.1441E-03  6.1903E+02 -1.2381E+04 -7.7902E+02  2.6046E+04THERM0263
4.0000E+00  0.0000E+00  3.4000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3296E+03 -1.1478E-03  5.9105E+02 -1.1819E+04 -7.7819E+02  2.6595E+04THERM0264
6.0000E+00  0.0000E+00  3.4000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3489E+03 -1.1673E-03  5.7069E+02 -1.1417E+04 -7.7719E+02  2.6974E+04THERM0265
```

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8.0000E+00  0.0000E+00  3.4000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3553E+03 -1.1805E-03  5.6368E+02 -1.1270E+04 -7.7656E+02  2.7111E+04THERM0266
1.0000E+01  0.0000E+00  3.4000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3580E+03 -1.1883E-03  5.6050E+02 -1.1215E+04 -7.7617E+02  2.7153E+04THERM0267
1.2000E+01  0.0000E+00  3.4000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3597E+03 -1.1933E-03  5.5866E+02 -1.1170E+04 -7.7595E+02  2.7199E+04THERM0268
1.4000E+01  0.0000E+00  3.4000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3607E+03 -1.1967E-03  5.5764E+02 -1.1156E+04 -7.7584E+02  2.7209E+04THERM0269
1.5000E+01  0.0000E+00  3.4000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3611E+03 -1.1980E-03  5.5729E+02 -1.1143E+04 -7.7582E+02  2.7227E+04THERM0270
2.0000E+00  0.0000E+00  3.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2418E+03 -1.1677E-03  6.9356E+02 -1.3871E+04 -7.9490E+02  2.4836E+04THERM0271
3.0000E+00  0.0000E+00  3.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3166E+03 -1.1221E-03  6.0786E+02 -1.2157E+04 -7.8859E+02  2.6333E+04THERM0272
4.0000E+00  0.0000E+00  3.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3436E+03 -1.1202E-03  5.7803E+02 -1.1565E+04 -7.8694E+02  2.6866E+04THERM0273
6.0000E+00  0.0000E+00  3.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3628E+03 -1.1288E-03  5.5645E+02 -1.1125E+04 -7.8527E+02  2.7261E+04THERM0274
8.0000E+00  0.0000E+00  3.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3693E+03 -1.1355E-03  5.4863E+02 -1.0977E+04 -7.8439E+02  2.7380E+04THERM0275
1.0000E+01  0.0000E+00  3.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3722E+03 -1.1398E-03  5.4505E+02 -1.0898E+04 -7.8389E+02  2.7449E+04THERM0276
1.2000E+01  0.0000E+00  3.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3738E+03 -1.1423E-03  5.4316E+02 -1.0866E+04 -7.8358E+02  2.7471E+04THERM0277
1.4000E+01  0.0000E+00  3.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3748E+03 -1.1438E-03  5.4203E+02 -1.0838E+04 -7.8342E+02  2.7500E+04THERM0278
1.5000E+01  0.0000E+00  3.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3752E+03 -1.1444E-03  5.4167E+02 -1.0836E+04 -7.8339E+02  2.7500E+04THERM0279
2.0000E+00  0.0000E+00  3.6000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2574E+03 -1.1526E-03  6.8608E+02 -1.3722E+04 -8.0617E+02  2.5147E+04THERM0280
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4.0000E+00  0.0000E+00  3.6000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3575E+03 -1.1007E-03  5.6403E+02 -1.1278E+04 -7.9540E+02  2.7152E+04THERM0282
6.0000E+00  0.0000E+00  3.6000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3765E+03 -1.1051E-03  5.4108E+02 -1.0824E+04 -7.9314E+02  2.7527E+04THERM0283
8.0000E+00  0.0000E+00  3.6000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3829E+03 -1.1091E-03  5.3282E+02 -1.0654E+04 -7.9203E+02  2.7661E+04THERM0284
1.0000E+01  0.0000E+00  3.6000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3857E+03 -1.1115E-03  5.2910E+02 -1.0585E+04 -7.9140E+02  2.7710E+04THERM0285
1.2000E+01  0.0000E+00  3.6000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3873E+03 -1.1130E-03  5.2703E+02 -1.0539E+04 -7.9104E+02  2.7748E+04THERM0286
1.4000E+01  0.0000E+00  3.6000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3882E+03 -1.1140E-03  5.2589E+02 -1.0520E+04 -7.9084E+02  2.7761E+04THERM0287
1.5000E+01  0.0000E+00  3.6000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3887E+03 -1.1144E-03  5.2544E+02 -1.0507E+04 -7.9080E+02  2.7776E+04THERM0288
2.0000E+00  0.0000E+00  3.7000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2727E+03 -1.1400E-03  6.7759E+02 -1.3551E+04 -8.1694E+02  2.5455E+04THERM0289
3.0000E+00  0.0000E+00  3.7000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3444E+03 -1.0891E-03  5.8259E+02 -1.1651E+04 -8.0660E+02  2.6890E+04THERM0290
4.0000E+00  0.0000E+00  3.7000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3709E+03 -1.0816E-03  5.4919E+02 -1.0985E+04 -8.0356E+02  2.7417E+04THERM0291
6.0000E+00  0.0000E+00  3.7000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3897E+03 -1.0834E-03  5.2509E+02 -1.0499E+04 -8.0078E+02  2.7796E+04THERM0292
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1.0000E+01  0.0000E+00  3.7000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3990E+03 -1.0883E-03  5.1224E+02 -1.0242E+04 -7.9874E+02  2.7984E+04THERM0294
1.2000E+01  0.0000E+00  3.7000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.4006E+03 -1.0894E-03  5.0990E+02 -1.0200E+04 -7.9832E+02  2.8009E+04THERM0295
1.4000E+01  0.0000E+00  3.7000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.4016E+03 -1.0901E-03  5.0866E+02 -1.0171E+04 -7.9809E+02  2.8035E+04THERM0296
1.5000E+01  0.0000E+00  3.7000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.4020E+03 -1.0903E-03  5.0822E+02 -1.0167E+04 -7.9804E+02  2.8038E+04THERM0297
2.0000E+00  0.0000E+00  3.8000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.2879E+03 -1.1261E-03  6.6795E+02 -1.3359E+04 -8.2724E+02  2.5758E+04THERM0298
3.0000E+00  0.0000E+00  3.8000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3579E+03 -1.0700E-03  5.6851E+02 -1.1370E+04 -8.1506E+02  2.7158E+04THERM0299
4.0000E+00  0.0000E+00  3.8000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3839E+03 -1.0605E-03  5.3360E+02 -1.0670E+04 -8.1144E+02  2.7681E+04THERM0300
6.0000E+00  0.0000E+00  3.8000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.4025E+03 -1.0605E-03  5.0828E+02 -1.0170E+04 -8.0820E+02  2.8044E+04THERM0301
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1.5000E+01  0.0000E+00  3.8000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.4148E+03 -1.0657E-03  4.9057E+02 -9.8097E+03 -8.0510E+02  2.8297E+04THERM0306
2.0000E+00  0.0000E+00  3.9000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.3030E+03 -1.1099E-03  6.5707E+02 -1.3137E+04 -8.3708E+02  2.6066E+04THERM0307
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8.0000E+00  0.0000E+00  4.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.4330E+03 -1.0083E-03  4.6277E+02 -9.2541E+03 -8.2060E+02  2.8661E+04THERM0320
1.0000E+01  0.0000E+00  4.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.4356E+03 -1.0089E-03  4.5830E+02 -9.1686E+03 -8.1963E+02  2.8709E+04THERM0321
1.2000E+01  0.0000E+00  4.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.4372E+03 -1.0095E-03  4.5575E+02 -9.1142E+03 -8.1907E+02  2.8745E+04THERM0322
1.4000E+01  0.0000E+00  4.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.4381E+03 -1.0100E-03  4.5425E+02 -9.0873E+03 -8.1877E+02  2.8760E+04THERM0323
1.5000E+01  0.0000E+00  4.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.4386E+03 -1.0102E-03  4.5368E+02 -9.0725E+03 -8.1869E+02  2.8774E+04THERM0324
```

Listing 4.3 ZONAIR Solution File: THERMi

```
(Only SHOWS the file:THERM0001)
      8      64       2       1UVWCP   1P,5E16.9
      1       1      64
 6.789267063E-03 4.805326462E-04 5.717942715E-01 5.135470629E-01 4.817758203E-01
 4.585480690E-01 4.396029711E-01 4.232070446E-01 4.084888697E-01 3.949568868E-01
 3.823106885E-01 3.627509475E-01 3.413421512E-01 3.189724684E-01 2.948293686E-01
 2.806720734E-01 2.003856301E-01 1.782751083E-02 8.712649345E-03 1.259056330E-01
 2.839162350E-01 2.865498066E-01 3.102762699E-01 3.413421512E-01 3.665290475E-01
 3.864405751E-01 3.993574381E-01 4.132434130E-01 4.284523726E-01 4.455744028E-01
 4.656879306E-01 4.910055399E-01 5.279328823E-01 6.171896458E-01 4.585480690E-01
 4.455744028E-01 4.284523726E-01 4.181436896E-01 4.038643241E-01 3.906537890E-01
 3.782590032E-01 3.665290475E-01 3.590351343E-01 3.413421512E-01 3.219955564E-01
 2.971912622E-01 2.811959386E-01 2.238786221E-02 4.235446453E-03 4.585480690E-01
 4.455744028E-01 4.284523726E-01 4.181436896E-01 4.038643241E-01 3.906537890E-01
 3.782590032E-01 3.665290475E-01 3.590351343E-01 3.413421512E-01 3.219955564E-01
 2.971912622E-01 2.811959386E-01 2.238786221E-02 4.235446453E-03
      2       1       1
 0.000000000E+00
      3       1      64
 6.210132316E-02 1.468092203E-02 3.301095366E-01 2.964932024E-01 2.781530917E-01
 2.647452950E-01 2.538042665E-01 2.443374693E-01 2.358411849E-01 2.280283868E-01
 2.207271755E-01 2.094340175E-01 1.970738024E-01 1.841595173E-01 1.702201366E-01
 1.620455533E-01 2.351514697E-01 9.430852532E-02-7.450746000E-02-2.146733254E-01
-1.639190614E-01-1.654389352E-01-1.791380048E-01-1.970738024E-01-2.116155773E-01
-2.231115401E-01-2.305688262E-01-2.385865003E-01-2.473666668E-01-2.572523654E-01
-2.688661814E-01-2.834716737E-01-3.047956228E-01-3.563324213E-01-2.647452950E-01
-2.572523654E-01-2.473666668E-01-2.414155006E-01-2.331710905E-01-2.255440950E-01
-2.183878124E-01-2.116155773E-01-2.072888911E-01-1.970738024E-01 1.859041899E-01
 1.715839207E-01 1.623488069E-01 1.043592542E-01 4.625983909E-02-2.647452950E-01
-2.572523654E-01-2.473666668E-01-2.414155006E-01-2.331710905E-01-2.255440950E-01
-2.183878124E-01-2.116155773E-01-2.072888911E-01-1.970738024E-01 1.859041899E-01
 1.715839207E-01 1.623488069E-01 1.043592542E-01 4.625983909E-02
      4       1      64
 1.700157046E+00 1.707506537E+00 6.652494073E-01 8.149340749E-01 8.996474147E-01
 9.607827067E-01 1.009701967E+00 1.051200986E+00 1.087720633E+00 1.120633721E+00
 1.150778770E+00 1.196199059E+00 1.244264126E+00 1.292564631E+00 1.341477394E+00
 1.363949180E+00 1.420445085E+00 1.685338855E+00 1.696901679E+00 1.526892900E+00
 1.349177718E+00 1.356628299E+00 1.310680509E+00 1.244264126E+00 1.187540054E+00
 1.141001344E+00 1.110002995E+00 1.076003313E+00 1.038015962E+00 9.943884015E-01
 9.421096444E-01 8.749709725E-01 7.766770720E-01 5.660333037E-01 9.607827067E-01
 9.943884015E-01 1.038015962E+00 1.063846469E+00 1.099042654E+00 1.130959034E+00
 1.160308242E+00 1.187540054E+00 1.204663634E+00 1.244264126E+00 1.286167979E+00
 1.336923599E+00 1.364203334E+00 1.679828525E+00 1.703988910E+00 9.607827067E-01
 9.943884015E-01 1.038015962E+00 1.063846469E+00 1.099042654E+00 1.130959034E+00
 1.160308242E+00 1.187540054E+00 1.204663634E+00 1.244264126E+00 1.286167979E+00
 1.336923599E+00 1.364203334E+00 1.679828525E+00 1.703988910E+00
      5       1      64
 6.789267063E-03 4.805326462E-04 5.717942715E-01 5.135470629E-01 4.817758203E-01
 4.585480690E-01 4.396029711E-01 4.232070446E-01 4.084888697E-01 3.949568868E-01
 3.823106885E-01 3.627509475E-01 3.413421512E-01 3.189724684E-01 2.948293686E-01
 2.806720734E-01 2.003856301E-01 1.782751083E-02 8.712649345E-03 1.259056330E-01
 2.839162350E-01 2.865498066E-01 3.102762699E-01 3.413421512E-01 3.665290475E-01
 3.864405751E-01 3.993574381E-01 4.132434130E-01 4.284523726E-01 4.455744028E-01
 4.656879306E-01 4.910055399E-01 5.279328823E-01 6.171896458E-01 4.585480690E-01
 4.455744028E-01 4.284523726E-01 4.181436896E-01 4.038643241E-01 3.906537890E-01
 3.782590032E-01 3.665290475E-01 3.590351343E-01 3.413421512E-01 3.219955564E-01
 2.971912622E-01 2.811959386E-01 2.238786221E-02 4.235446453E-03 4.585480690E-01
 4.455744028E-01 4.284523726E-01 4.181436896E-01 4.038643241E-01 3.906537890E-01
 3.782590032E-01 3.665290475E-01 3.590351343E-01 3.413421512E-01 3.219955564E-01
 2.971912622E-01 2.811959386E-01 2.238786221E-02 4.235446453E-03
      6       1       1
 0.000000000E+00
      7       1      64
 6.210132316E-02 1.468092203E-02 3.301095366E-01 2.964932024E-01 2.781530917E-01
 2.647452950E-01 2.538042665E-01 2.443374693E-01 2.358411849E-01 2.280283868E-01
 2.207271755E-01 2.094340175E-01 1.970738024E-01 1.841595173E-01 1.702201366E-01
 1.620455533E-01 2.351514697E-01 9.430852532E-02-7.450746000E-02-2.146733254E-01
-1.639190614E-01-1.654389352E-01-1.791380048E-01-1.970738024E-01-2.116155773E-01
-2.231115401E-01-2.305688262E-01-2.385865003E-01-2.473666668E-01-2.572523654E-01
-2.688661814E-01-2.834716737E-01-3.047956228E-01-3.563324213E-01-2.647452950E-01
-2.572523654E-01-2.473666668E-01-2.414155006E-01-2.331710905E-01-2.255440950E-01
-2.183878124E-01-2.116155773E-01-2.072888911E-01-1.970738024E-01 1.859041899E-01
 1.715839207E-01 1.623488069E-01 1.043592542E-01 4.625983909E-02-2.647452950E-01
-2.572523654E-01-2.473666668E-01-2.414155006E-01-2.331710905E-01-2.255440950E-01
-2.183878124E-01-2.116155773E-01-2.072888911E-01-1.970738024E-01 1.859041899E-01
 1.715839207E-01 1.623488069E-01 1.043592542E-01 4.625983909E-02
      8       1      64
 1.700157046E+00 1.707506537E+00 6.652494073E-01 8.149340749E-01 8.996474147E-01
 9.607827067E-01 1.009701967E+00 1.051200986E+00 1.087720633E+00 1.120633721E+00
 1.150778770E+00 1.196199059E+00 1.244264126E+00 1.292564631E+00 1.341477394E+00
 1.363949180E+00 1.420445085E+00 1.685338855E+00 1.696901679E+00 1.526892900E+00
 1.349177718E+00 1.356628299E+00 1.310680509E+00 1.244264126E+00 1.187540054E+00
 1.141001344E+00 1.110002995E+00 1.076003313E+00 1.038015962E+00 9.943884015E-01
 9.421096444E-01 8.749709725E-01 7.766770720E-01 5.660333037E-01 9.607827067E-01
 9.943884015E-01 1.038015962E+00 1.063846469E+00 1.099042654E+00 1.130959034E+00
 1.160308242E+00 1.187540054E+00 1.204663634E+00 1.244264126E+00 1.286167979E+00
 1.336923599E+00 1.364203334E+00 1.679828525E+00 1.703988910E+00 9.607827067E-01
 9.943884015E-01 1.038015962E+00 1.063846469E+00 1.099042654E+00 1.130959034E+00
```

```
1.160308242E+00 1.187540054E+00 1.204663634E+00 1.244264126E+00 1.286167979E+00
1.336923599E+00 1.364203334E+00 1.679828525E+00 1.703988910E+00
      9       1      64
1.700157046E+00 1.707506537E+00 6.652494073E-01 8.149340749E-01 8.996474147E-01
9.607827067E-01 1.009701967E+00 1.051200986E+00 1.087720633E+00 1.120633721E+00
1.150778770E+00 1.196199059E+00 1.244264126E+00 1.292564631E+00 1.341477394E+00
1.363949180E+00 1.420445085E+00 1.685338855E+00 1.696901679E+00 1.526892900E+00
1.349177718E+00 1.356628299E+00 1.310680509E+00 1.244264126E+00 1.187540054E+00
1.141001344E+00 1.110002995E+00 1.076003313E+00 1.038015962E+00 9.943884015E-01
9.421096444E-01 8.749709725E-01 7.766770720E-01 5.660333037E-01 9.607827067E-01
9.943884015E-01 1.038015962E+00 1.063846469E+00 1.099042654E+00 1.130959034E+00
1.160308242E+00 1.187540054E+00 1.204663634E+00 1.244264126E+00 1.286167979E+00
1.336923599E+00 1.364203334E+00 1.679828525E+00 1.703988910E+00 9.607827067E-01
9.943884015E-01 1.038015962E+00 1.063846469E+00 1.099042654E+00 1.130959034E+00
1.160308242E+00 1.187540054E+00 1.204663634E+00 1.244264126E+00 1.286167979E+00
1.336923599E+00 1.364203334E+00 1.679828525E+00 1.703988910E+00
```

- *Output Data Listing*

Listing 4.4 Standard Output File: WEDGE_TPS.OUT


```
                                    E X E C U T I V E   C O N T R O L   S U M M A R Y

          |...1...|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|..10...|

          ASSIGN AEROBASE='CFDTABLE.DAT',PRINT=0
          SOL 1
          CEND

                                      C A S E   C O N T R O L   S U M M A R Y

                                S I N G L E   P R E C I S I O N   C O M P U T A T I O N

                           M A X I M U M   A L L O C A B L E   M E M O R Y   = 800   M E G A B Y T E S

          |...1...|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|..10...|


          ECHO = SORT
          SUBCASE = 1
          SUBTITLE=BENT-NOSE  BODY AT MACH 10.5, AoA=0.0 Degrees
          LABEL= HYPERSONIC AERODYNAMIC ANALYSIS
          TPSDES=1
          BEGIN BULK

                                      S O R T E D   B U L K   D A T A   E C H O
CARD
COUNT     |...1...|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|..10...|
```

```
 1 -       DESVAR  1       6       1                                                       CONT
 2 -       CONT    14      15      16      17      18      19
 3 -       DESVAR  2       3       1                                                       CONT
 4 -       CONT    1       6       13                                                      CONT
 5 -       DESVAR  3       3       1                                                       CONT
 6 -       CONT    20      26      32
 7 -       PANLST2 11              14      15      16      17      18      19
 8 -       PANLST2 12              14      15      16      17      18      19
 9 -       PANLST2 21              1       THRU    13
10 -       PANLST2 22              1       6       13
11 -       PANLST2 31              20      THRU    32
12 -       PANLST2 32              20      26      32
13 -       PARAM   STREAM  1.E-6
14 -       PATCH   1       11      12
15 -       PATCH   2       21      22
16 -       PATCH   3       31      32
17 -       PLTAERO 1       YES     NO              NASTRAN AEROMESH.NAS
18 -       PLTTPS  -2      1       ALL     TECPLOT WEDGETE STS.PLT -1.0
19 -       PLTTPS  1       1       ALL     TECPLOT WEDGETE STM.PLT 0.05
20 -       PRVAL   4               30000000
21 -       PODRSM  1       1                       SAVE    WEDGE30 .RST    CONT
22 -       CONT    CPPODRSM.P3D    UPODRSM.P3D     VPODRSM .P3D    WPODRSM .P3D
23 -       STTYPE  1       1       508                                                     CONT
24 -       CONT    0.01
25 -       STTYPE  2       1       501                                                     CONT
26 -       CONT    1.0
27 -       STTYPE  3       6       245                                                     CONT
28 -       CONT    0.01
29 -       STTYPE  4       1       313                                                     CONT
30 -       CONT    0.05
31 -       STTYPE  5       6       245                                                     CONT
32 -       CONT    0.01
33 -       STTYPE  6       1       103                                                     CONT
34 -       CONT    0.1
35 -       STTYPE  31      6       221                                                     CONT
36 -       CONT    0.02
37 -       STTYPE  32      1       266                                                     CONT
38 -       CONT    0.02
39 -       STTYPE  33      1       260                                                     CONT
40 -       CONT    1.
41 -       STTYPE  34      1       266                                                     CONT
42 -       CONT    0.15
43 -       STTYPE  35      6       245                                                     CONT
44 -       CONT    0.2
45 -       STTYPE  36      1       103                                                     CONT
46 -       CONT    0.1
47 -       THERMPR 1       100F
48 -       TPSDES  1       1       1       1                                               CONT
49 -       CONT    1       2       3
50 -       TPSSYM  1       1       6       4                                               CONT
51 -       CONT    1       1       0.008   0.05                                            CONT
52 -       CONT    1       2       0.5     4.0                                             CONT
53 -       CONT    1       3       0.01    0.1                                             CONT
54 -       CONT    1       4       0.015   0.2                                             CONT
55 -       CONT    1       5       0.01    0.1                                             CONT
56 -       CONT    0       6       0.02    0.2
57 -       TPSSYM  2       2       6       4                                               CONT
58 -       CONT    2       31      0.005   0.1                                             CONT
59 -       CONT    2       32      0.005   0.1                                             CONT
60 -       CONT    2       33      0.3     5.0                                             CONT
61 -       CONT    2       34      0.02    1.0                                             CONT
62 -       CONT    2       35      0.01    0.8                                             CONT
63 -       CONT    0       36      0.01    1.0
64 -       TPSSYM  3       3       6       4                                               CONT
65 -       CONT    3       1       0.008   0.05                                            CONT
66 -       CONT    3       2       0.5     4.0                                             CONT
67 -       CONT    3       3       0.01    0.1                                             CONT
68 -       CONT    3       4       0.015   0.2                                             CONT
69 -       CONT    3       5       0.01    0.1                                             CONT
70 -       CONT    0       6       0.02    0.2
71 -       TRAJCT  1       1                                                               CONT
72 -       CONT    .00000E00.71871 .45600E64.0000                                          CONT
73 -       CONT    .16000E20.98944 .41990E614.0000                                         CONT
74 -       CONT    .33000E21.34826 .43688E69.4208                                          CONT
75 -       CONT    .49000E21.63429 .58196E63.6000                                          CONT
76 -       CONT    .68000E22.17754 .82141E63.6000                                          CONT
77 -       CONT    .88000E22.99306 .11358E73.6000                                          CONT
78 -       CONT    .10800E34.03065 .14897E73.6000                                          CONT
79 -       CONT    .12800E35.30536 .18668E73.6000                                          CONT
80 -       CONT    .14700E37.18387 .22489E78.7000                                          CONT
81 -       CONT    .16500E38.14718 .26307E710.2250                                         CONT
82 -       CONT    .18500E38.48577 .29382E710.2250                                         CONT
83 -       CONT    .20500E38.73075 .31108E710.2250                                         CONT
84 -       CONT    .22500E38.80061 .31479E710.2250                                         CONT
85 -       CONT    .24500E38.62765 .30495E710.2250                                         CONT
86 -       CONT    .26300E38.35804 .28476E730.0000                                         CONT
87 -       CONT    .28300E37.92715 .25083E730.0000                                         CONT
88 -       CONT    .30300E37.42020 .20828E730.0000                                         CONT
89 -       CONT    .32300E36.98630 .17006E730.0000                                         CONT
90 -       CONT    .34100E36.51451 .15705E717.6576                                         CONT
91 -       CONT    .35900E36.29482 .15555E711.3822                                         CONT
92 -       CONT    .37900E36.12626 .15505E711.5945                                         CONT
93 -       CONT    .39900E35.96248 .15405E711.6852                                         CONT
```

```
                94 -       CONT    .41900E35.80340 .15256E711.6316                              CONT
                95 -       CONT    .43900E35.64886 .15063E711.4712                              CONT
                96 -       CONT    .45900E35.49856 .14827E711.2120                              CONT
                97 -       CONT    .47900E35.35216 .14551E710.8676                              CONT
                98 -       CONT    .49900E35.20938 .14237E710.4565                              CONT
                99 -       CONT    .51900E35.06993 .13890E79.9883                               CONT
               100 -       CONT    .53900E34.92935 .13511E79.3991                               CONT
               101 -       CONT    .55900E34.78106 .13103E78.7931                               CONT
               102 -       CONT    .57900E34.62119 .12670E78.2187                               CONT
               103 -       CONT    .59900E34.44764 .12216E77.6847                               CONT
               104 -       CONT    .61900E34.25902 .11747E77.2020                               CONT
               105 -       CONT    .63900E34.05448 .11267E76.7771                               CONT
               106 -       CONT    .65900E33.82413 .10782E76.3472                               CONT
               107 -       CONT    .67900E33.56631 .10300E75.9874                               CONT
               108 -       CONT    .69900E33.28723 .98254E65.7202                               CONT
               109 -       CONT    .71759E33.00000 .93312E64.8191                               CONT
               110 -       CONT    .73600E32.68846 .87329E64.1829                               CONT
               111 -       CONT    .75600E32.29065 .80146E63.4982                               CONT
               112 -       CONT    .77600E31.86649 .72891E63.0646                               CONT
               113 -       CONT    .79600E31.47000 .66074E63.0928                               CONT
               114 -       CONT    .81600E31.14676 .59940E63.3054                               CONT
               115 -       CONT    .83600E30.96665 .54315E63.8323                               CONT
               116 -       CONT    .85600E30.86983 .48792E63.8046                               CONT
               117 -       CONT    .87400E30.80178 .43914E63.9110                               CONT
               118 -       CONT    .89400E30.73186 .38870E63.9359                               CONT
               119 -       CONT    .91400E30.67432 .34157E63.9549                               CONT
               120 -       CONT    .93400E30.62713 .29712E63.9492                               CONT
               121 -       CONT    .95400E30.58784 .25488E63.9046                               CONT
               122 -       CONT    .97400E30.55190 .21464E63.8498                               CONT
               123 -       CONT    .99400E30.51899 .17633E63.8233                               CONT
               124 -       CONT    .10140E40.48941 .13984E63.8101                               CONT
               125 -       CONT    .10340E40.46307 .10502E63.8009                               CONT
               126 -       CONT    .10540E40.43975 .71741E53.7895                               CONT
               127 -       CONT    .10740E40.41915 .39891E53.7718                               CONT
               128 -       CONT    .10940E40.40098 .93915E43.7458
               129 -       TRJLST  1                                                            CONT
               130 -       CONT    1       1.
               131 -       ENDDATA
```

```
                                    ****************************************
                                    *                                      *
                                    *       SUBCASE       =        1       *
                                    *       DISCIPLINE    = TPSDES         *
                                    *       BULK ENTRY ID =        1       *
                                    *                                      *
                                    ****************************************
```

```
                OPTIMIZATION SYSTEM FOR TPSSYM =     1


 TOTAL NUMBER OF DESIGN VARIABLES =   30
 TOTAL NUMBER OF CONSTRAINS       =  792
 TOTAL NUMBER OF TEMP. CONSTRAINS =  792
 TOTAL NUMBER OF TEMP. PRINTOUTS  =   22


MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
    X   0.2223E+04
   1.0 B
       |     B    B     B
       |                      B
       |                            B    B     A
       |                                 B     B    B
       |                                                 B     B
       |                                                       A
       |                                                             A     B    B     B
       |                                                                   A               B    B     B
       F     F    F     F     F     F     F     D     D    D     D     D    D    A     A    A               B     B
       |                                      F     F    F     F     F     F    F     F    F    F     D     D     A    B
   0.0 +-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----F-----F----+F----F-----+
       |
       |
       |
       |
       |
       |
       |
       |
       |
  -1.0 +
       .05         .15         .25         .35         .45         .55         .65         .75         .85         .95       1.05
                                                          TIME  ( X 2.803E-44 )


                MAXIMUM TEMPERATURE OF EVERY LAYER
LAYER:         1         2         3         4         5         6
Tmax:    2300.33   2400.33    550.33    450.33    550.33    350.33
Optv:    2223.00   2219.04    449.45    449.45    349.96    349.96

                VALUES OF DESIGN VARIABLES :
```

```
LAYER    DEV01    DEV02    DEV03    DEV04    DEV05    DEV06
    1  0.00800  0.00808  0.00800  0.00902  0.00809  0.00810
    2  0.56594  0.82798  1.06020  1.23897  1.07278  0.94884
    3  0.01000  0.01010  0.01000  0.01127  0.01345  0.01013
    4  0.01500  0.11378  0.12437  0.19531  0.12512  0.12317
    5  0.01000  0.01010  0.01000  0.01127  0.01361  0.01013

 THE ORIGINAL OBJECTIVE FUNCTION =       6.0350003

 THE RATIO OF OPTIMAL OBJECTIVE FUNCTION =   0.9909588

 THE TOTAL OPTIMAL WEIGHT = 3.75722822E+03

              OPTIMAL STRUCTURES OF TPS FOR PATCH =       1
                    (WITH AVERAGE THICKNESS)
 ============================================================   -----
                                                                  i
                       RCG COATING          slab                0.00821 in.  2223.0 F
                                                                  i
 ============================================================   -----
                                                                  i
                       LI900                slab                0.95245 in.  2219.0 F
                                                                  i
 ============================================================   -----
                       RTV-560              thin skin           0.01082 in.   449.4 F
 ============================================================   -----
                                                                  i
                       5.4 LB SIP           slab                0.11612 in.   449.4 F
                                                                  i
 ============================================================   -----
                       RTV-560              thin skin           0.01085 in.   350.0 F
 ============================================================   -----
                                                                  i
                       ALUMINUM 7075-T6     slab                0.10000 in.   350.0 F
                                                                  i
 ============================================================   -----

         THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =       1

   PANEL   LAYER01            LAYER02            LAYER03            LAYER04            LAYER05            LAYER06
      14   0.00800   1250.59   0.56594   1250.09   0.01000    550.33   0.01500    352.40   0.01000    351.18   0.10000    349.96
      15   0.00808   1709.70   0.82798   1708.53   0.01010    550.33   0.11378    447.56   0.01010    397.52   0.10000    347.48
      16   0.00800   2031.55   1.06020   2030.66   0.01000    550.33   0.12437    447.03   0.01000    396.73   0.10000    346.42
      17   0.00902   2161.90   1.23897   2159.80   0.01127    550.33   0.19531    447.91   0.01127    366.64   0.10000    285.37
      18   0.00809   2223.00   1.07278   2221.02   0.01345    550.33   0.12512    449.20   0.01361    397.55   0.10000    345.89
      19   0.00810   2122.85   0.94884   2120.86   0.01013    550.33   0.12317    449.45   0.01013    398.03   0.10000    346.61

                  OPTIMIZATION SYSTEM FOR TPSSYM =     2


 TOTAL NUMBER OF DESIGN VARIABLES =   15
 TOTAL NUMBER OF CONSTRAINS       =  496
 TOTAL NUMBER OF TEMP. CONSTRAINS =  396
 TOTAL NUMBER OF TEMP. PRINTOUTS  =   22

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
    X   0.1211E+04
   1.0 C     C
       |          C     C     C
       |                      C
       |                           C
       |                                C     C    C
       |                                                 C     C     C
       |
       F     F    F     F     F     F    F     F     F    F     D     D          C     C     C    C     C     C
       |                                                 F     F     F    F     D          B     B    B     C    C
       |                                                                        F     F    F     F    F     F    F
   0.0 +-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+
       |
       |
       |
       |
       |
       |
       |
       |
       |
       |
  -1.0 +
       .05         .15         .25         .35         .45         .55         .65         .75         .85         .95       1.05
                                                              TIME  ( X 2.803E-44 )


              MAXIMUM TEMPERATURE OF EVERY LAYER
LAYER:        1        2        3        4        5        6
Tmax:    2300.33  2020.33  1800.33  2020.33   550.33   350.33
Optv:    1211.14  1211.14  1206.49   354.15   350.15   350.15

                  VALUES OF DESIGN VARIABLES :
LAYER    DEV01    DEV02    DEV03
    1  0.00500  0.00505  0.00500
    2  0.00500  0.00505  0.00500
```

```
   3  0.33529  0.40782  0.53436
   4  0.02000  0.02020  0.02000
   5  0.01000  0.01010  0.01000

 THE ORIGINAL OBJECTIVE FUNCTION =      36.4379196

 THE RATIO OF OPTIMAL OBJECTIVE FUNCTION =   0.1323187

 THE TOTAL OPTIMAL WEIGHT = 1.87973729E+04

              OPTIMAL STRUCTURES OF TPS FOR PATCH =       2
                    (WITH AVERAGE THICKNESS)
 ============================================================   -----
                      HRSI COAT           thin skin           0.00502 in.  1211.1 F
 ============================================================   -----
                                                                i
                      AB312 Fabric        slab                0.00502 in.  1211.1 F
                                                                i
 ============================================================   -----
                                                                i
                      Q-Felt(3.5 PCF)     slab                0.42582 in.  1206.5 F
                                                                i
 ============================================================   -----
                                                                i
                      AB312 Fabric        slab                0.02007 in.   354.2 F
                                                                i
 ============================================================   -----
                      RTV-560             thin skin           0.01003 in.   350.2 F
 ============================================================   -----
                                                                i
                      ALUMINUM 7075-T6    slab                0.10000 in.   350.2 F
                                                                i
 ============================================================   -----


          THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =       2

   PANEL   LAYER01            LAYER02            LAYER03            LAYER04            LAYER05            LAYER06
       1   0.00500    960.98  0.00500    960.98  0.33529    957.01  0.02000    653.60  0.01000    352.15  0.10000    350.15
       2   0.00502   1004.09  0.00502   1004.09  0.34808   1000.13  0.02007    674.83  0.01004    351.46  0.10000    349.43
       3   0.00503   1042.23  0.00503   1042.23  0.36206   1038.31  0.02013    693.68  0.01006    350.92  0.10000    348.87
       4   0.00504   1126.85  0.00504   1126.85  0.37691   1119.58  0.02017    352.16  0.01008    348.11  0.10000    348.11
       5   0.00505   1103.40  0.00505   1103.40  0.39229   1099.65  0.02019    724.10  0.01010    350.27  0.10000    348.23
       6   0.00505   1126.85  0.00505   1126.85  0.40782   1123.21  0.02020    735.87  0.01010    350.13  0.10000    348.11
       7   0.00505   1146.08  0.00505   1146.08  0.42318   1142.57  0.02020    745.58  0.01010    350.10  0.10000    348.11
       8   0.00505   1161.60  0.00505   1161.60  0.43808   1158.22  0.02019    753.49  0.01010    350.14  0.10000    348.15
       9   0.00504   1173.93  0.00504   1173.93  0.45227   1170.70  0.02018    759.83  0.01009    350.24  0.10000    348.28
      10   0.00504   1187.28  0.00504   1187.28  0.47131   1184.24  0.02015    766.78  0.01007    350.45  0.10000    348.53
      11   0.00503   1211.14  0.00503   1211.14  0.49382   1206.49  0.02011    353.40  0.01005    349.89  0.10000    349.89
      12   0.00501   1206.74  0.00501   1206.74  0.51532   1204.19  0.02005    777.33  0.01003    351.22  0.10000    349.41
      13   0.00500   1211.14  0.00500   1211.14  0.53436   1208.81  0.02000    779.95  0.01000    351.65  0.10000    349.89


                  OPTIMIZATION SYSTEM FOR TPSSYM =     3


 TOTAL NUMBER OF DESIGN VARIABLES =   15
 TOTAL NUMBER OF CONSTRAINS       =  496
 TOTAL NUMBER OF TEMP. CONSTRAINS =  396
 TOTAL NUMBER OF TEMP. PRINTOUTS  =   22


MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
    X   0.2103E+04
   1.0 B
       |     B
       |
       |          B     B     B
       |                      A     B     B     B
       |                                        B     B     B
       |                                              A     B
       |                                                    A     B     B     B
       F     F     F     F     F     F     F     F     F     D     D     D     D     F     B     B     B     B     B
       |                                                    F     F     F     F     F     F     F     F     D     D     A     B
   0.0 +-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----F-----F----+F----F-----+
       |
       |
       |
       |
       |
       |
       |
       |
       |
       |
  -1.0 +
       .05         .15         .25         .35         .45         .55         .65         .75         .85         .95        1.05
                                                              TIME  ( X 2.803E-44 )


               MAXIMUM TEMPERATURE OF EVERY LAYER
 LAYER:         1         2         3         4         5         6
 Tmax:    2300.33   2400.33    550.33    450.33    550.33    350.33
 Optv:    2103.05   2099.08    447.63    447.63    349.73    349.74
```

```
                  VALUES OF DESIGN VARIABLES :
LAYER    DEV01    DEV02    DEV03
    1  0.00808  0.00800  0.00808
    2  0.81594  0.67940  0.58516
    3  0.01010  0.01000  0.01010
    4  0.11833  0.01500  0.01515
    5  0.01010  0.01000  0.01010

 THE ORIGINAL OBJECTIVE FUNCTION =      13.0758333

 THE RATIO OF OPTIMAL OBJECTIVE FUNCTION =   0.7439033

 THE TOTAL OPTIMAL WEIGHT = 2.35277212E+04

               OPTIMAL STRUCTURES OF TPS FOR PATCH =       3
                     (WITH AVERAGE THICKNESS)
 ============================================================   -----
                                                                  i
                       RCG COATING          slab                0.00806 in.  2103.0 F
                                                                  i
 ============================================================   -----
                                                                  i
                       LI900                slab                0.69350 in.  2099.1 F
                                                                  i
 ============================================================   -----
                       RTV-560              thin skin           0.01007 in.   447.6 F
 ============================================================   -----
                                                                  i
                       5.4 LB SIP           slab                0.04950 in.   447.6 F
                                                                  i
 ============================================================   -----
                       RTV-560              thin skin           0.01007 in.   349.7 F
 ============================================================   -----
                                                                  i
                       ALUMINUM 7075-T6     slab                0.10000 in.   349.7 F
                                                                  i
 ============================================================   -----


         THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =       3

  PANEL   LAYER01            LAYER02            LAYER03            LAYER04            LAYER05            LAYER06
     20   0.00808   2103.05  0.81594   2101.06  0.01010   550.33   0.11833   447.63   0.01010   397.57   0.10000   347.51
     21   0.00806   2102.04  0.79626   2100.01  0.01008   550.33   0.09998   430.51   0.01008   389.25   0.10000   347.99
     22   0.00804   2100.49  0.76470   2098.41  0.01005   550.33   0.07250   404.86   0.01005   376.76   0.10000   348.67
     23   0.00802   2099.09  0.73390   2096.96  0.01002   550.33   0.04845   382.37   0.01002   365.78   0.10000   349.20
     24   0.00801   2098.18  0.71215   2096.01  0.01001   550.33   0.03349   368.33   0.01001   358.91   0.10000   349.49
     25   0.00800   2097.56  0.69610   2095.37  0.01000   550.33   0.02375   359.17   0.01000   354.40   0.10000   349.64
     26   0.00800   2096.97  0.67940   2094.75  0.01000   550.33   0.01500   350.91   0.01000   350.32   0.10000   349.74
     27   0.00800   2096.43  0.66235   2094.19  0.01000   550.33   0.00800   348.83   0.01000   349.75   0.10000   349.74
     28   0.00801   2095.98  0.64530   2093.72  0.01001   550.33   0.00800   348.83   0.01001   349.67   0.10000   349.67
     29   0.00802   2095.64  0.62867   2093.37  0.01002   550.33   0.00800   348.83   0.01002   349.46   0.10000   349.46
     30   0.00803   2095.44  0.61284   2093.16  0.01004   550.33   0.00800   348.83   0.01004   349.12   0.10000   349.12
     31   0.00805   2095.41  0.59823   2093.12  0.01007   550.33   0.00800   348.83   0.01007   348.63   0.10000   348.63
     32   0.00808   2095.55  0.58516   2093.27  0.01010   550.33   0.01515   349.68   0.01010   348.83   0.10000   347.99


                                    ************************************
                                    ***                              ***
                                    *** T P S O P T  T E R M I N A T E D ***
                                    ***                              ***
                                    ***          N O R M A L L Y     ***
                                    ***                              ***
                                    ***      12:10:37    09/04/2005  ***
                                    ***                              ***
                                    ************************************
```

5.0 Micro-X Vehicle

- *Purpose*: To demonstrate the applicability of the TPSOPT software system for the Micro-X configuration.

- *Input File*:
  - Standard input File: MICRO_X_TPS.INP (Listing 5.1)
  - Aerodynamic Database: CFDTABLE.DAT (Listing 5.2)
  - Geometry File: MICROXGEO.DAT (Binary file)
  - ZONAIR Solution File: FLOWi (Listing 5.3)

- *Output File*:
  - Standard Output File: MICRO_X_TPS.OUT (Listing 5.4)
  - Vehicle Surface Mesh: MICRO_X_GEO.PLT (Figure 5.1)
  - Response surfaces for POD analysis (Figure 5.4)
  - C_p Plot File: CPTEMP.PLT (Figure 5.5)
  - Temperature Plot File: CPTEMP.PLT (Figure 5.6)
  - Thickness Distribution Plot File: MICRO_X_HT.PLT (Figure 5.7)

5.1 The Surface Mesh of the Micro-X Vehicle

The ZONAIR model for the Micro-X configuration consists of the body, two wings and one vertical wing. The surface panels shown in Figure 5.1 are generated by ZONAIR and outputted as a binary file “MICROXGEO.DAT”. This file is invoked by specifying the name on the second row of the aerodynamic database (CFDTABLE.DAT) that is imported by the “ASSIGN AEROBASE=” executive control command.

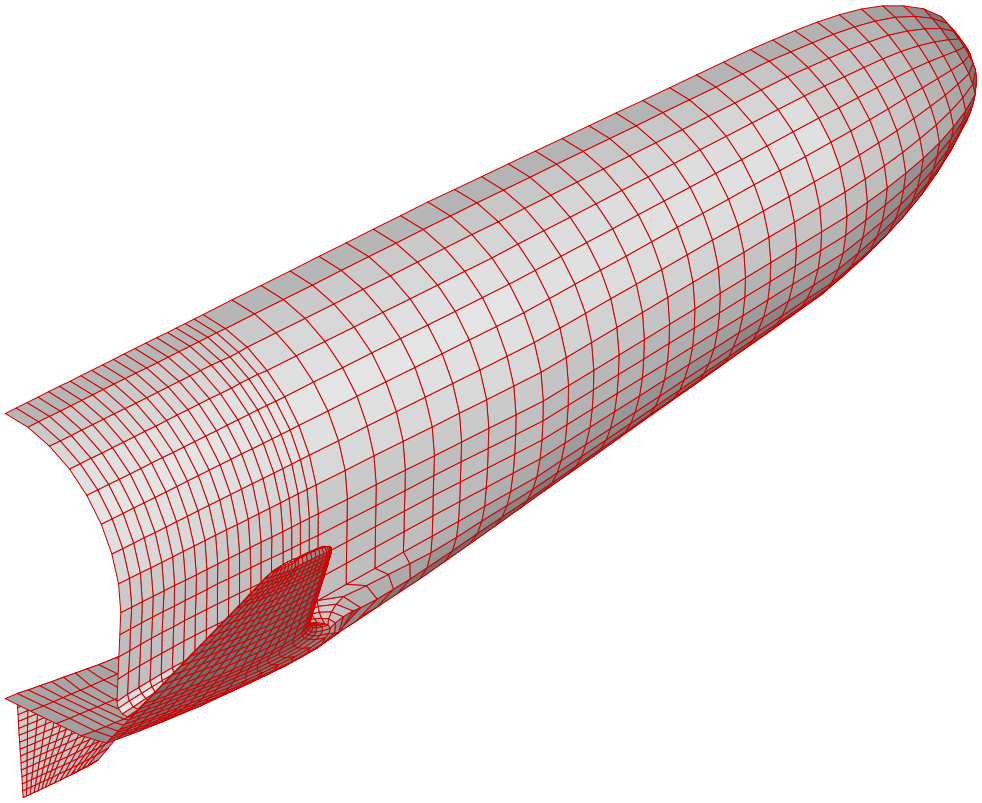


Figure 5.1. Surface mesh for Micro-X vehicle

5.2 The Aerodynamic Database: CFDTABLE.DAT

The aerodynamic database is generated by running ZONAIR for 80 combinations of 20 Mach numbers (2, 5, 8, 10, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27) and 4 angles of attack (0, 10, 20, 30). This file provides TPSOPT system with all flowfield information from ZONAIR. The first row is a title card (Micro-x model consists of body, wing and vertical wing); the second row provide the geometry file name (MICROXGEO.DAT); the third and fourth rows list the name of the reference chord, span, …etc, and their values, respectively; the fifth row lists the names of items in the following rows (Mach number, Altitude, Angle of attack, etc.) and the remaining rows contain the values of the items listed in the fifth row and the file names of flowfield (FLOW0001 to FLOW0080) in the last column which stored the velocity and pressure coefficients for the combination of the Mach number and Angle of attack listed in the corresponding row.

5.3 The Standard Input File (MICRO_X_TPS.INP)

The standard input file consists of two major parts: the flow field information and the TPS optimization system. The flow field information is provided by ZONAIR and imported by the aerodynamic database (CFDTABLE.DAT) using the following statement on the first row in the Input File:

ASSIGN AEROBASE='CFDTABLE.DAT'

The TPS optimization system is the major portion of the standard input file, which includes the definition of optimization patches for TPS and specification of trajectory data. Twenty nine optimization patches are defined over the TPS located on the whole vehicle surface (Figure 5.2), among which patch 1 is located around nose of the vehicle, 10 and 29 on the leading edge of the wing and 30 over the vertical wing. Figure 5.3 shows individual patches and panel numbers over them.

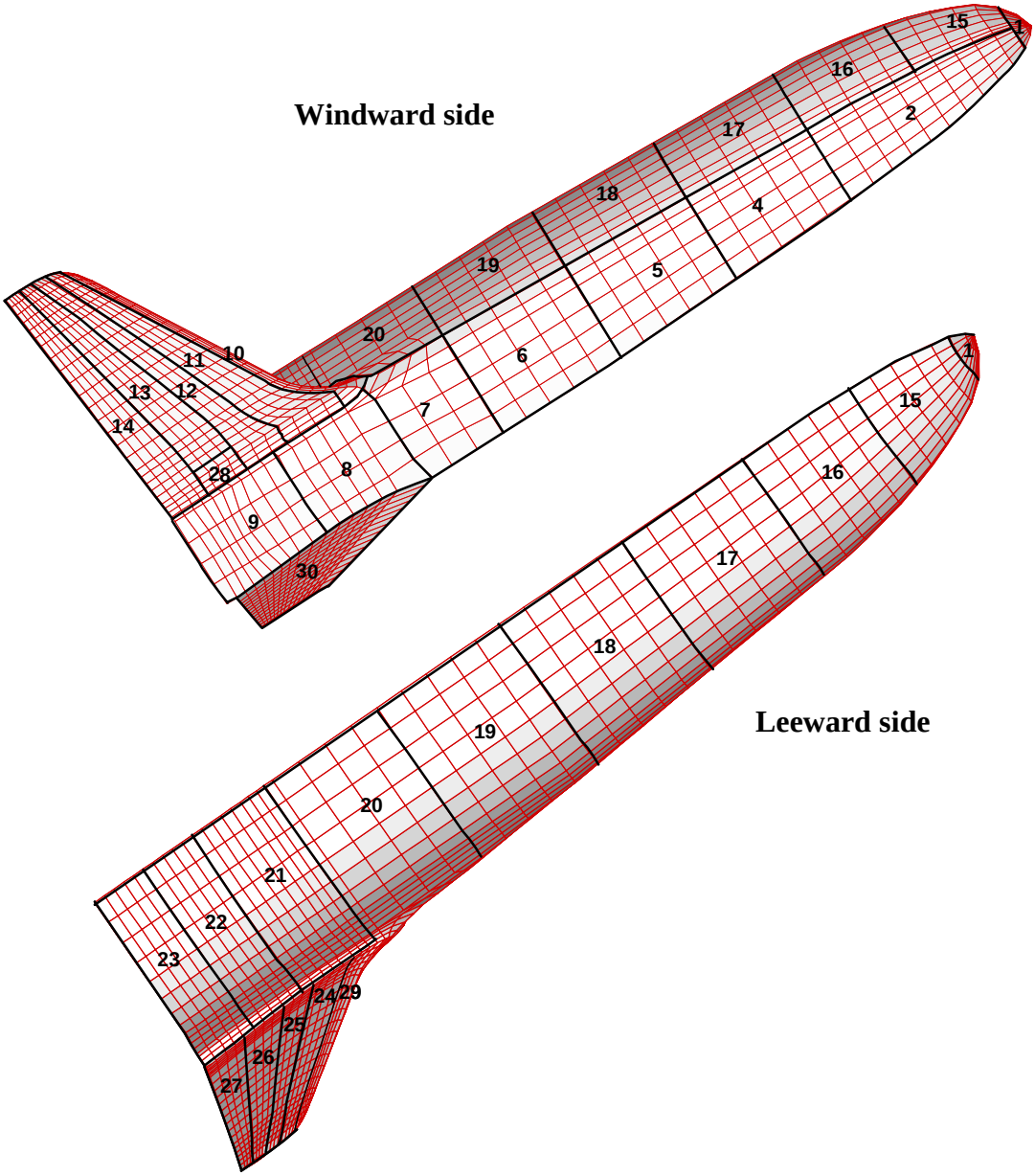
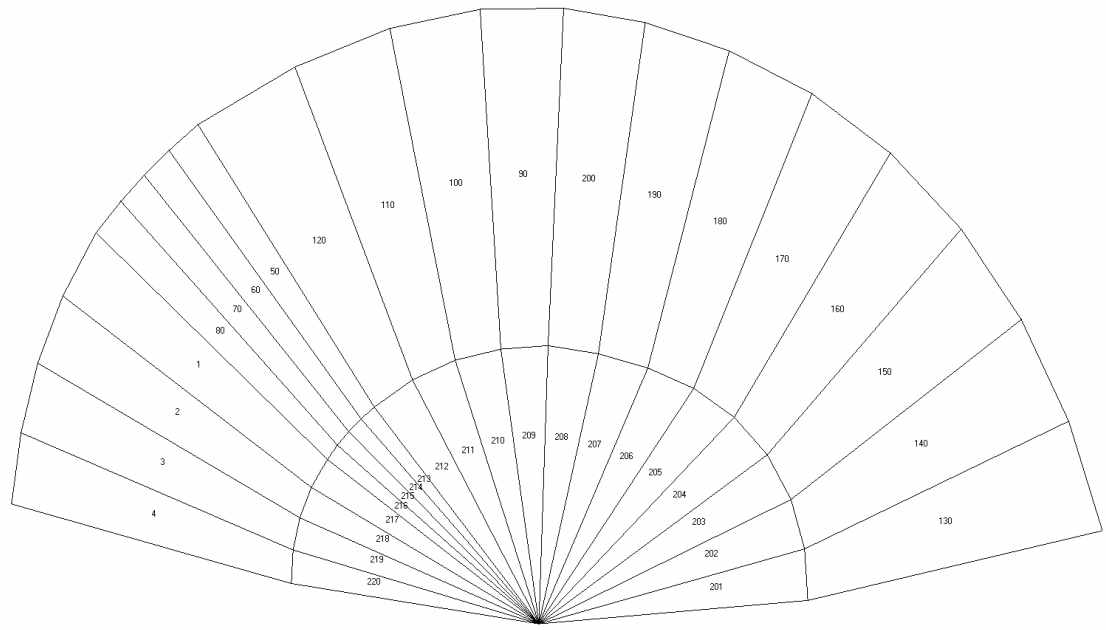
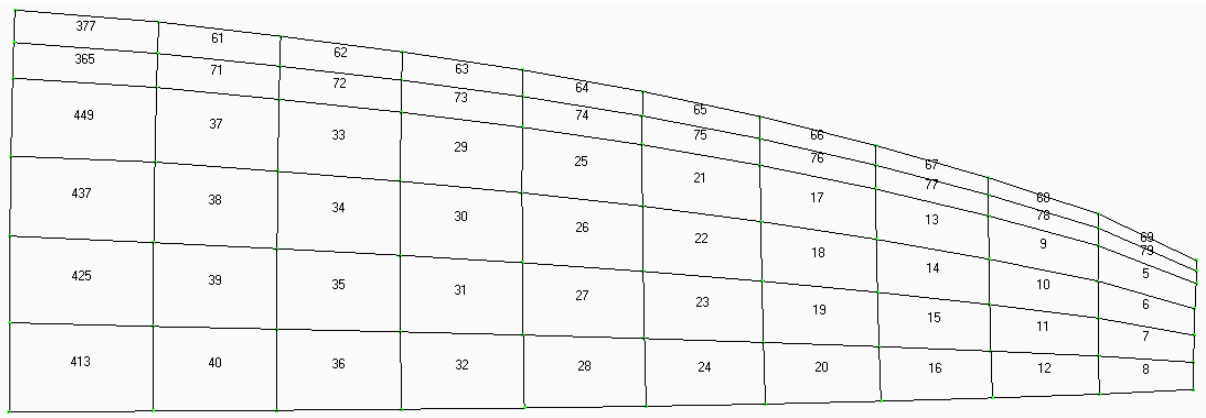


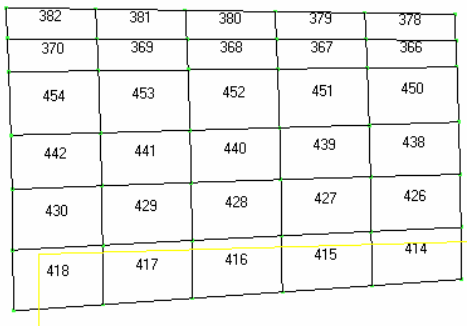
Figure 5.2. Twenty nine patches defined over TPS



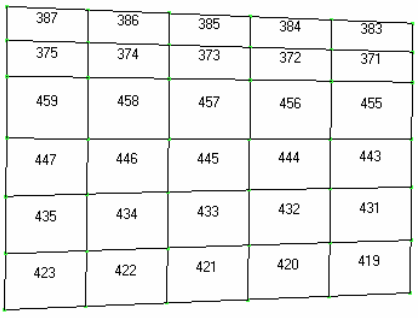
Patch1



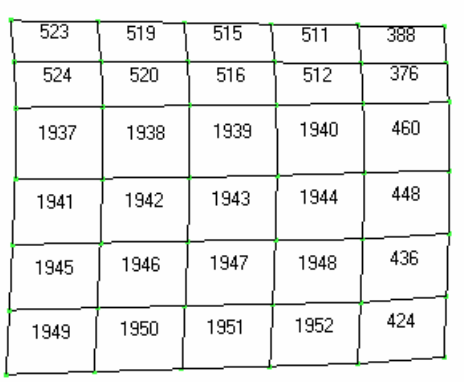
Patch 2



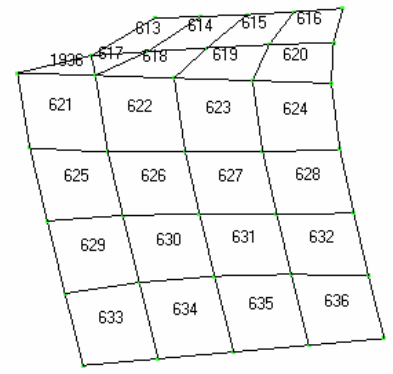
Patch 4



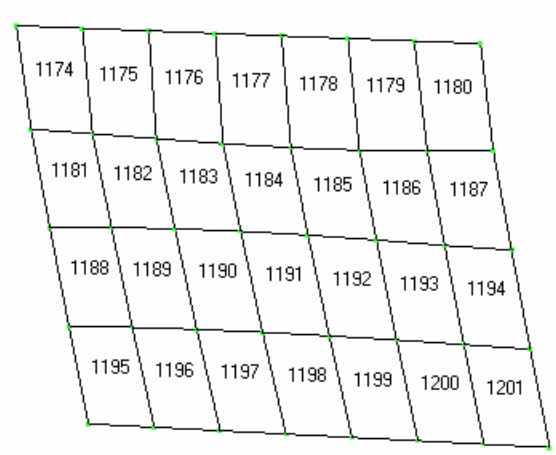
Patch5



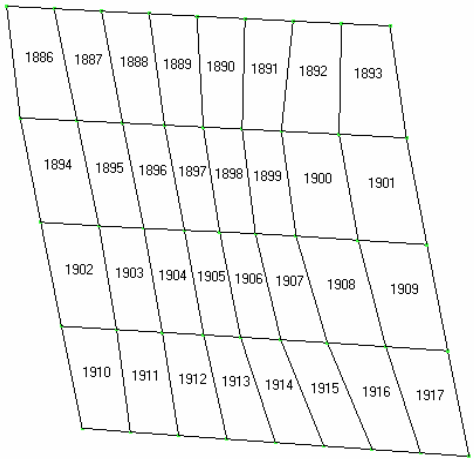
Patch 6



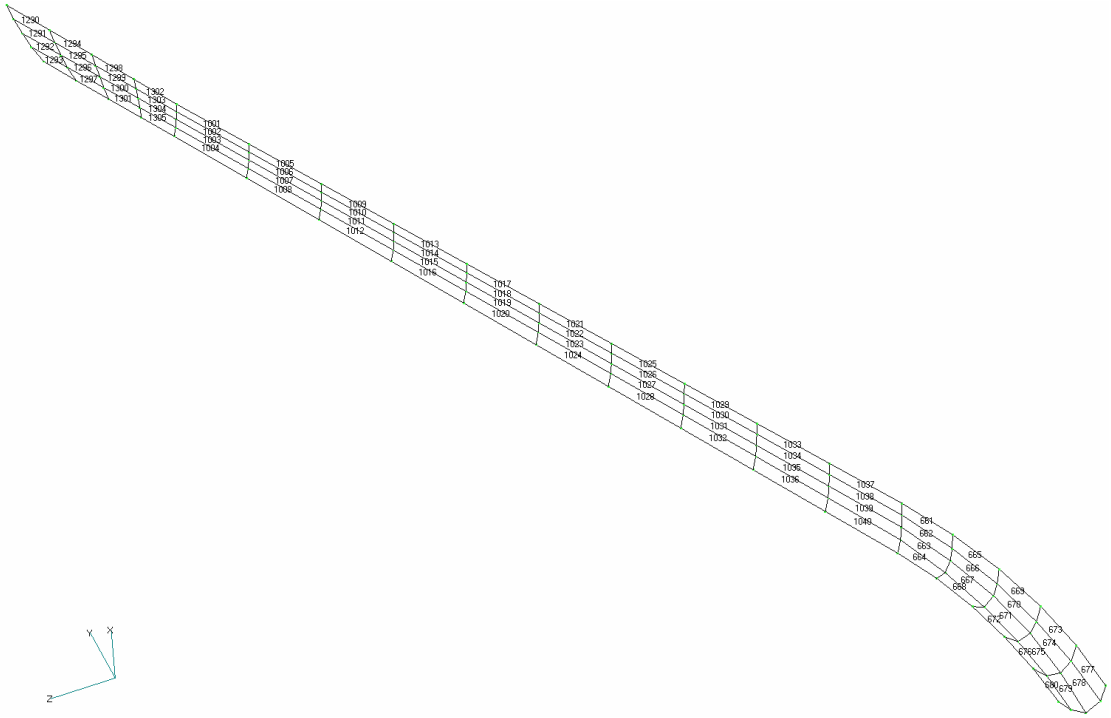
Patch 7



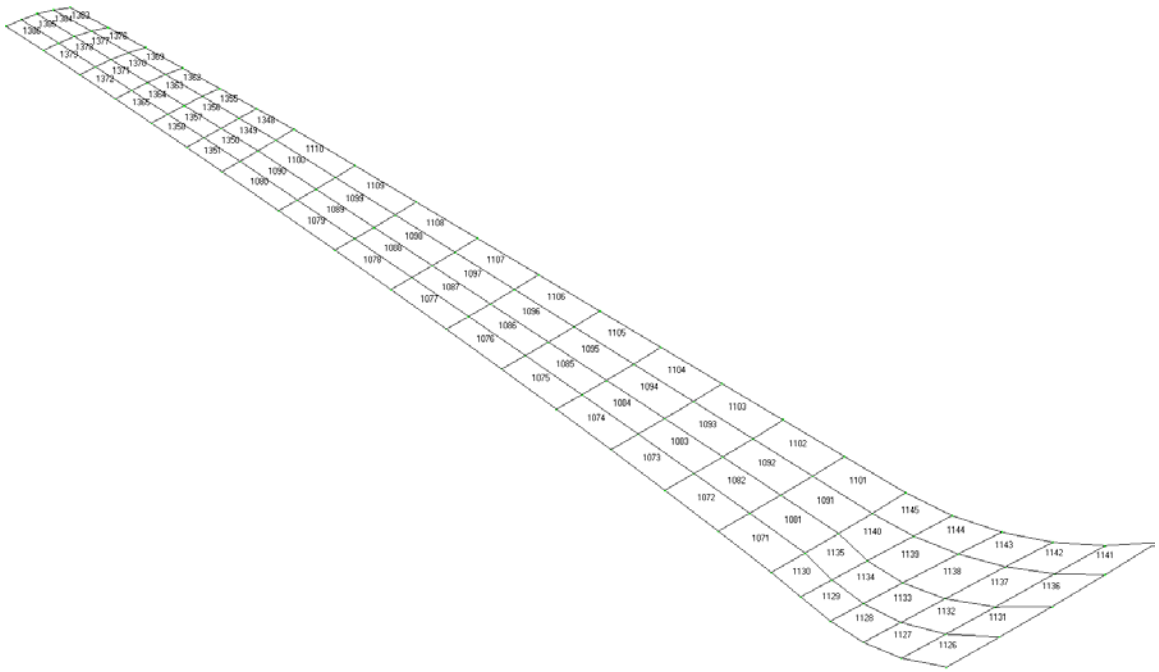
Patch 8



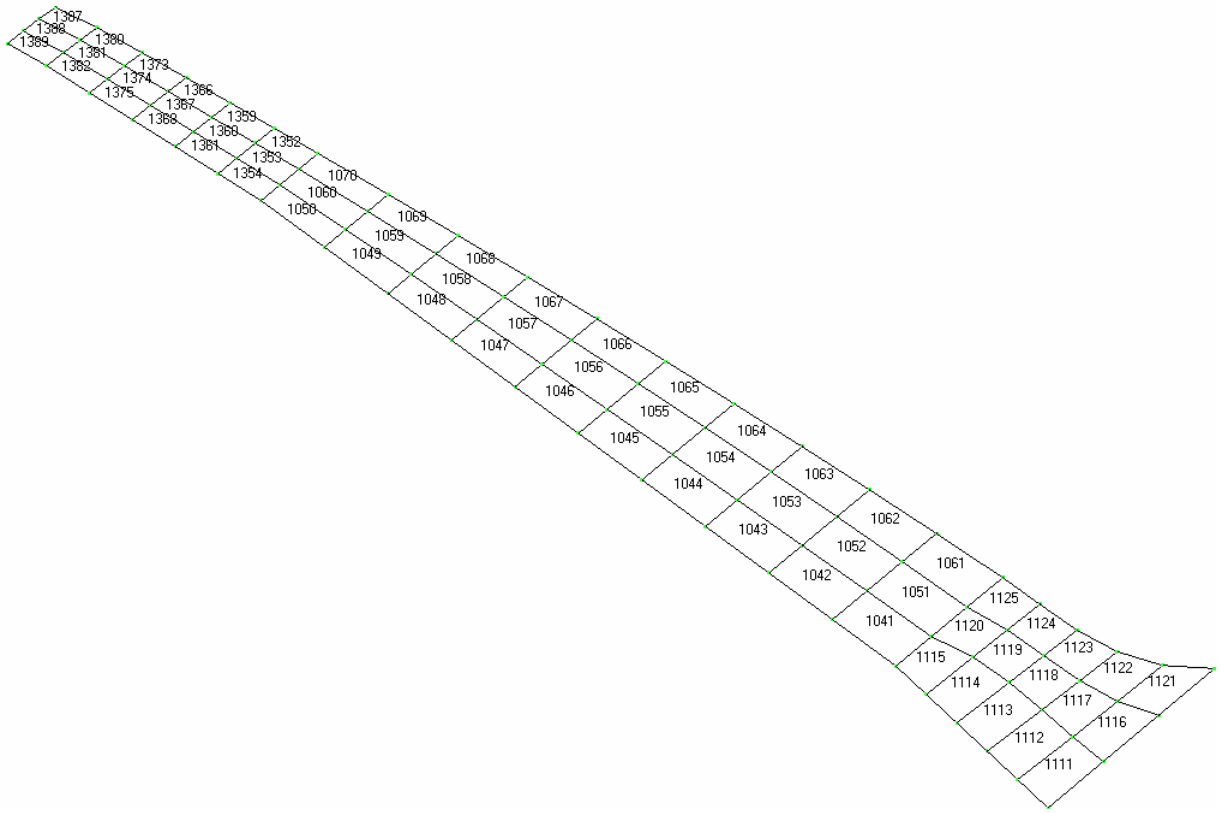
Patch 9



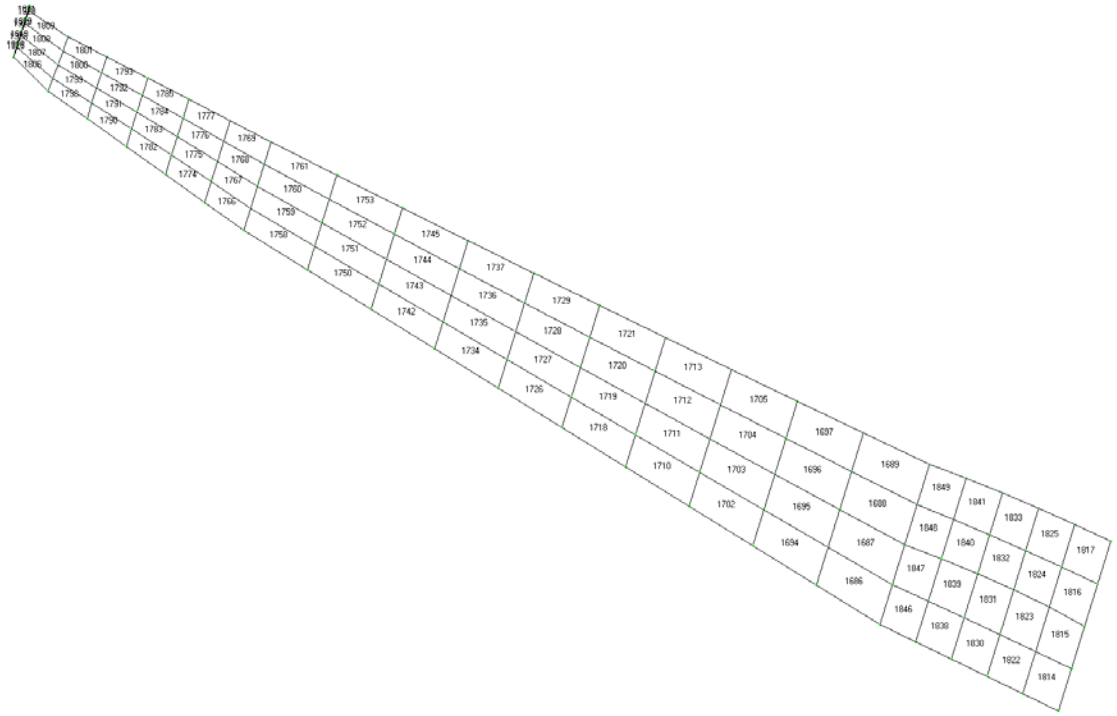
Patch 10



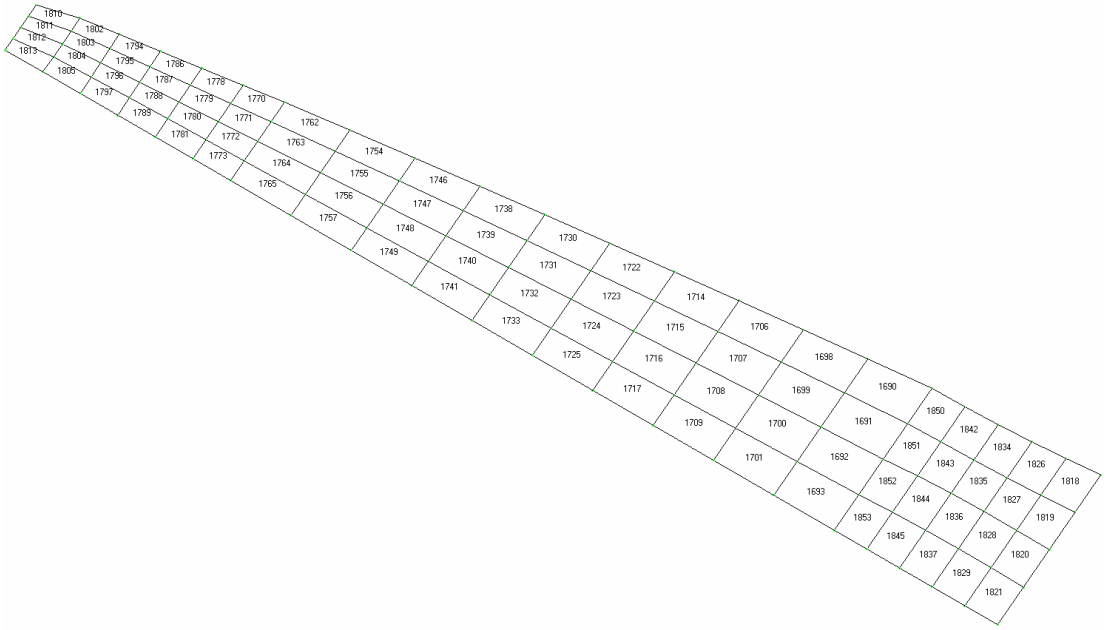
Patch 11



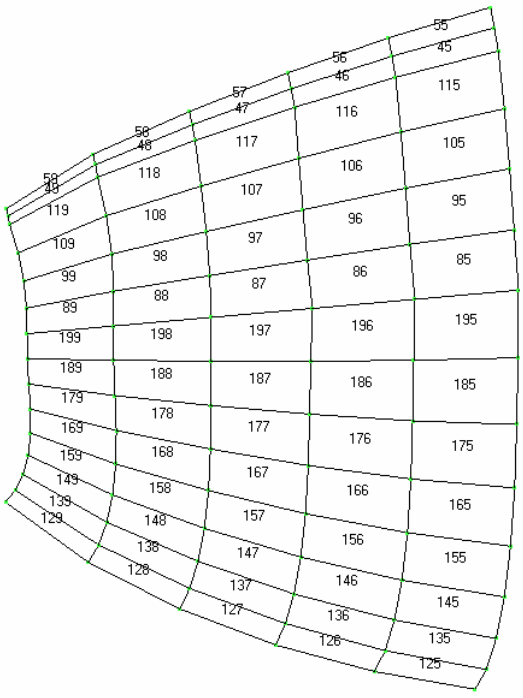
Patch 12



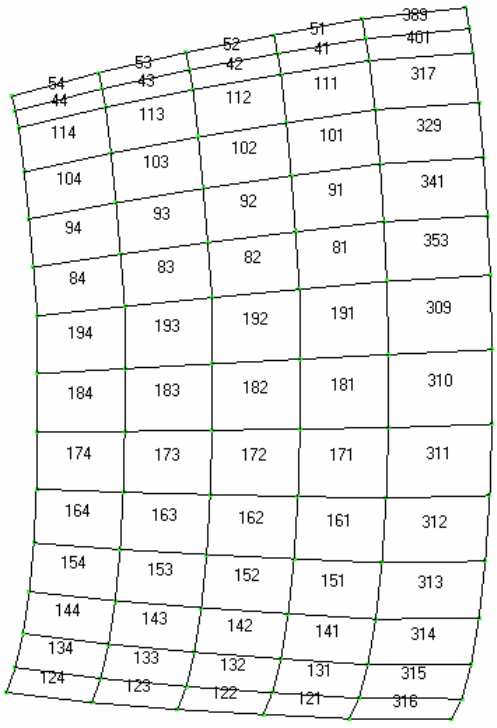
Patch 13



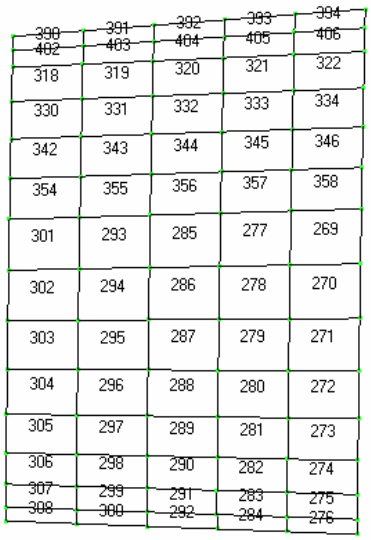
Patch 14



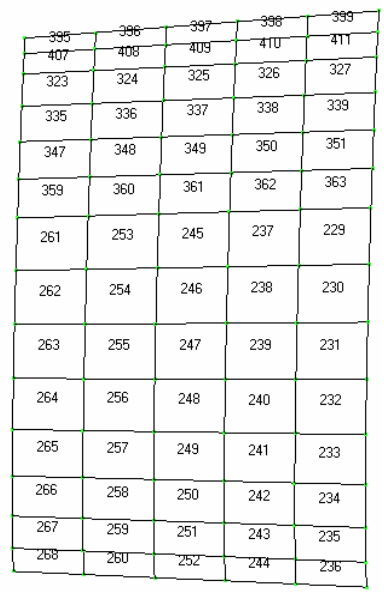
Patch 15



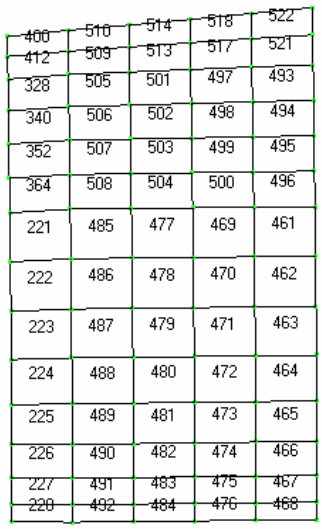
Patch 16



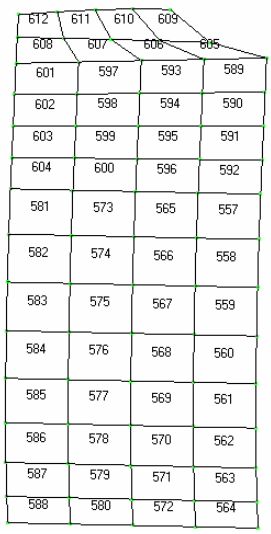
Patch 17



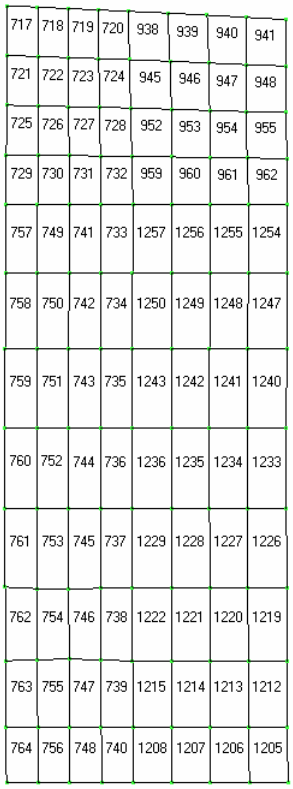
Patch 18



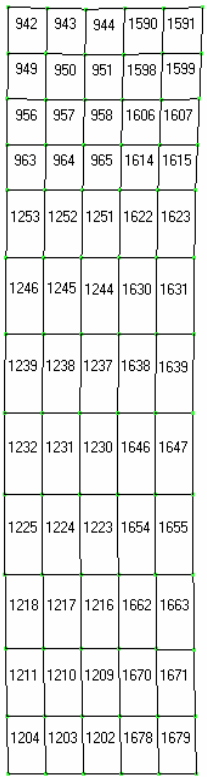
Patch 19



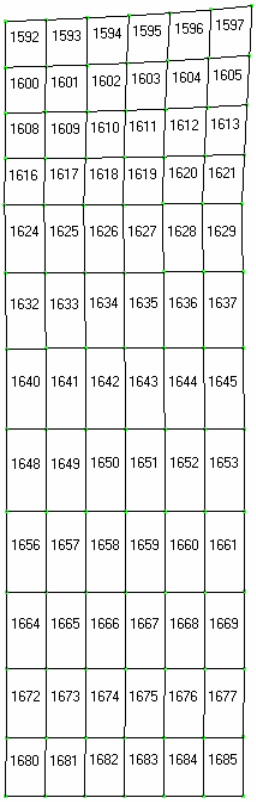
Patch 20



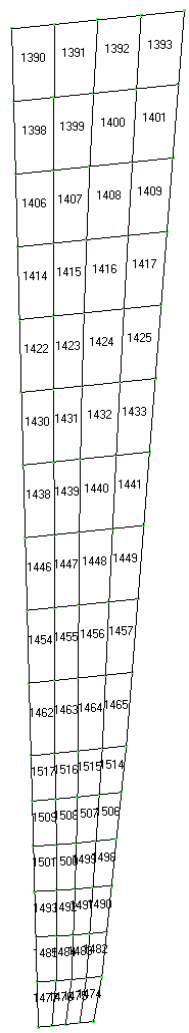
Patch 21



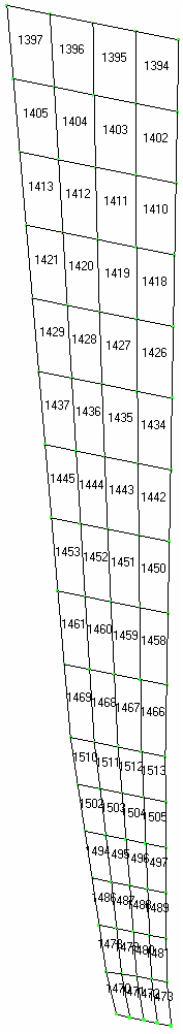
Patch 22



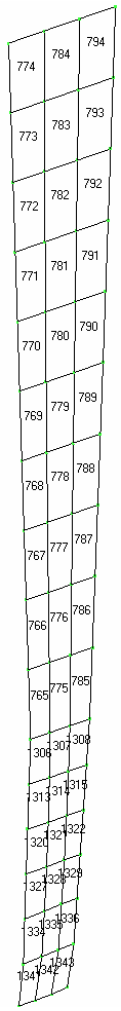
Patch 23



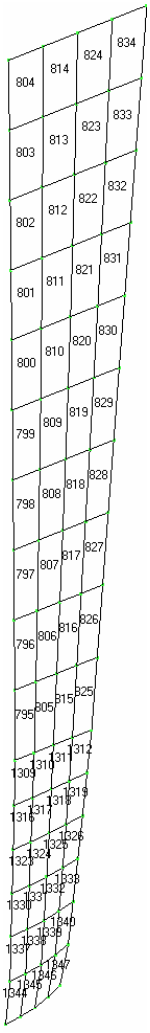
Patch 27



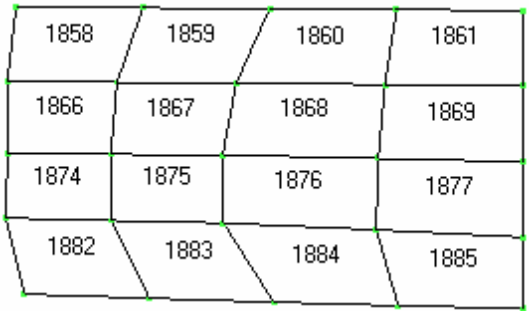
Patch 26



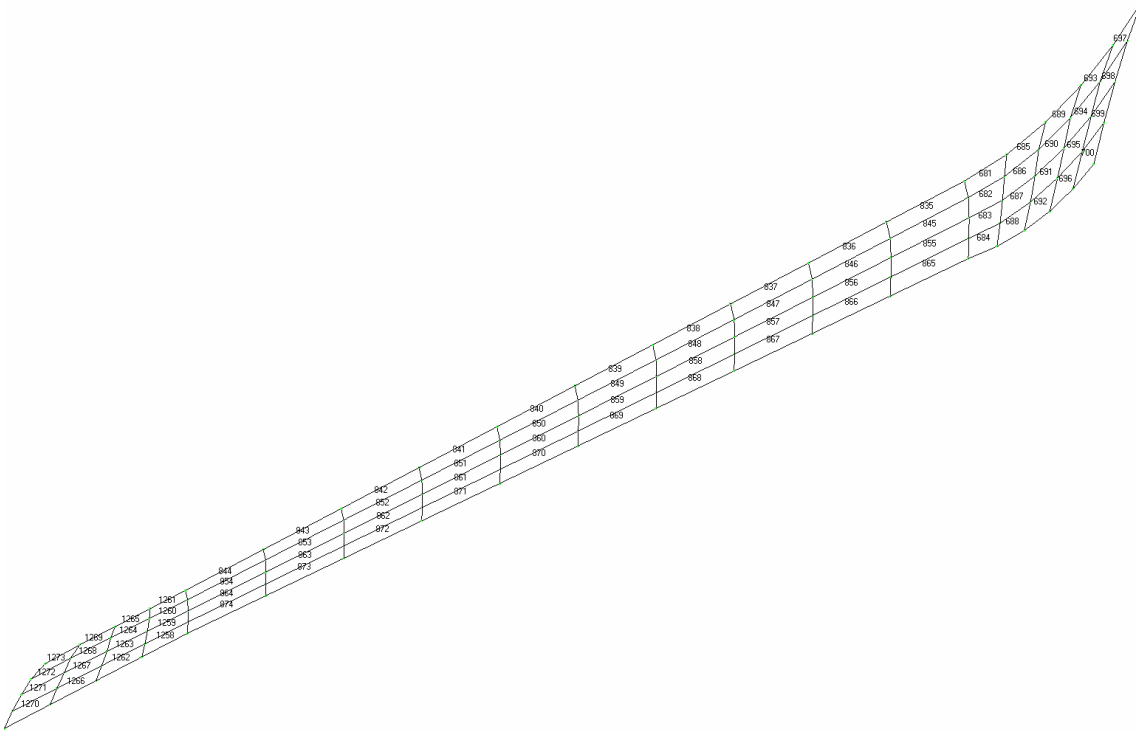
Patch 25



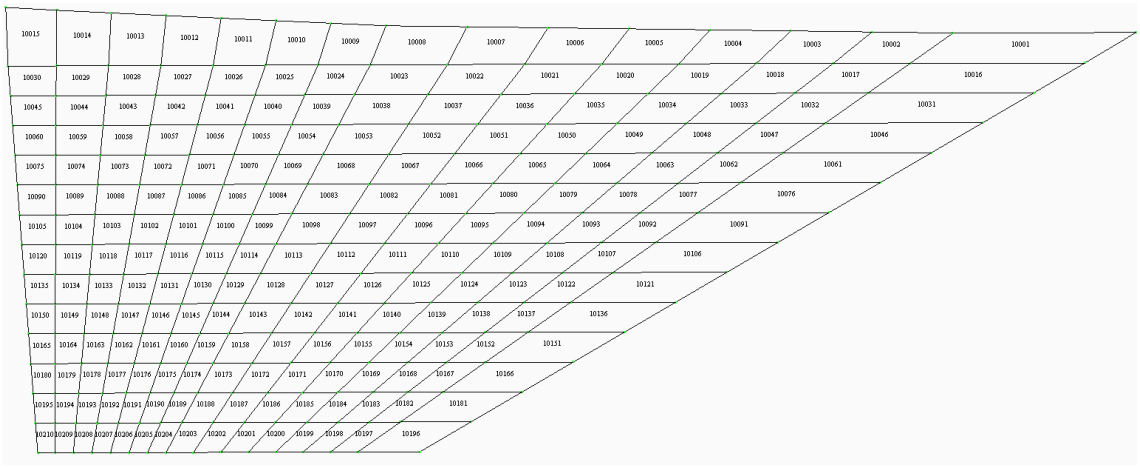
Patch 24



Patch 28



Patch 29



Patch 30

Figure 5.3. Individual view of the twenty nine patches

5.4 Thermal Structures for TPS Patches

Two sets of TPS structures are used for the Micro-X surface. The first one using 5 layers is for the nose (patch 1) and the wings (patches 10, 29 and 30), and the second one consisting of 4 layers is for the remaing patches.

The thermal structures specified for the first set TPS using the STTYPE numbers 11, 12, 13, 14, 15 are Thin skin, Radiation gap, Slab, Thin skin and Slab and the corresponding optimization materials are 256 (ACC((N)), 129 (ZIRCONIUM), 225 (LI-2200 (N)), 245 (RTV-560), 247 (LB SIP) and the maximum temperatures for these materials are: $3260\,^0R$, $3160\,^0R$, $1010\,^0R$ and $1060\,^0R$.

The structures specified for the second set TPS using the STTYPE numbers 21, 42, 23, 24 are Thin skin, Slab, Thin skin and Slab. The corresponding optimization materials are 221 (HRSI COAT), 224 (LI-900 (P)), 245 (RTV-560) and 247 (LB SIP) and the maximum temperatures for these materials are: $2760\,^0R$, $2760\,^0R$, $1010\,^0R$ and $1060\,^0R$.

No structure layers are defined for the TPS. That means that all layer's thinkness may be changed during computation of optimization.

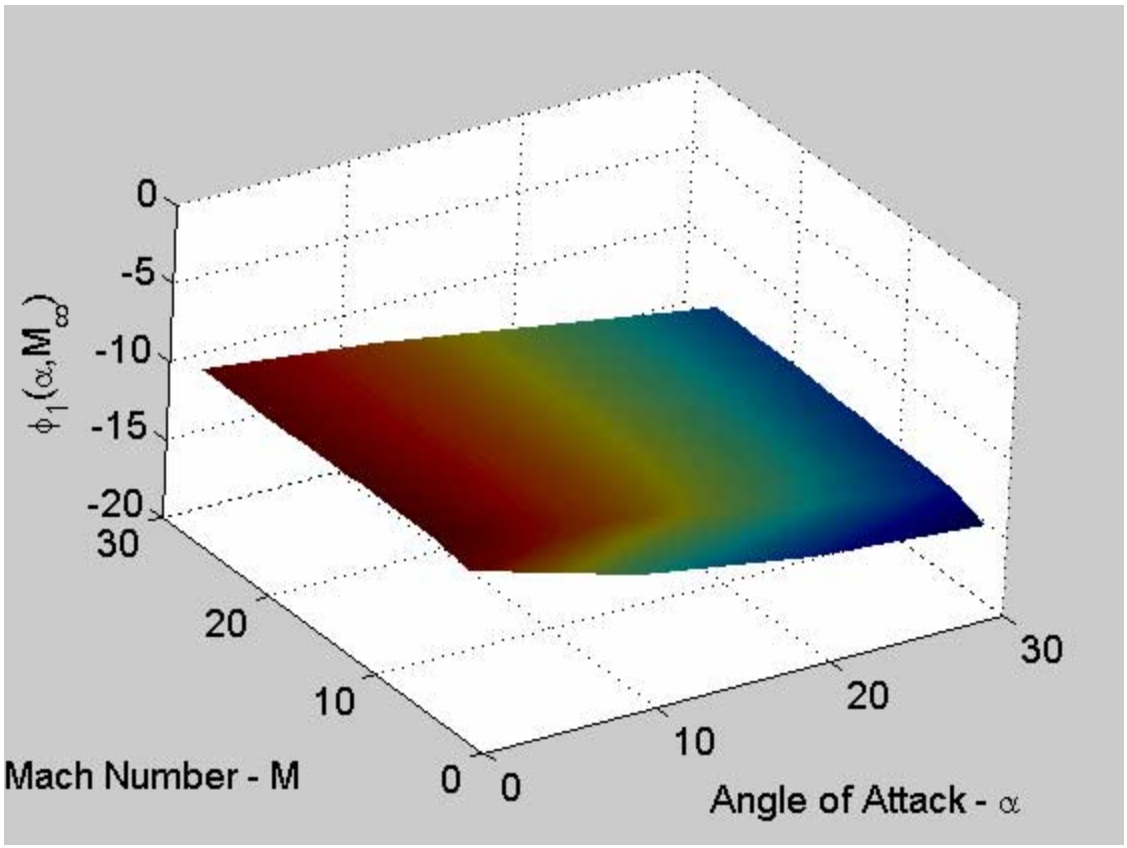
5.5 Output Information

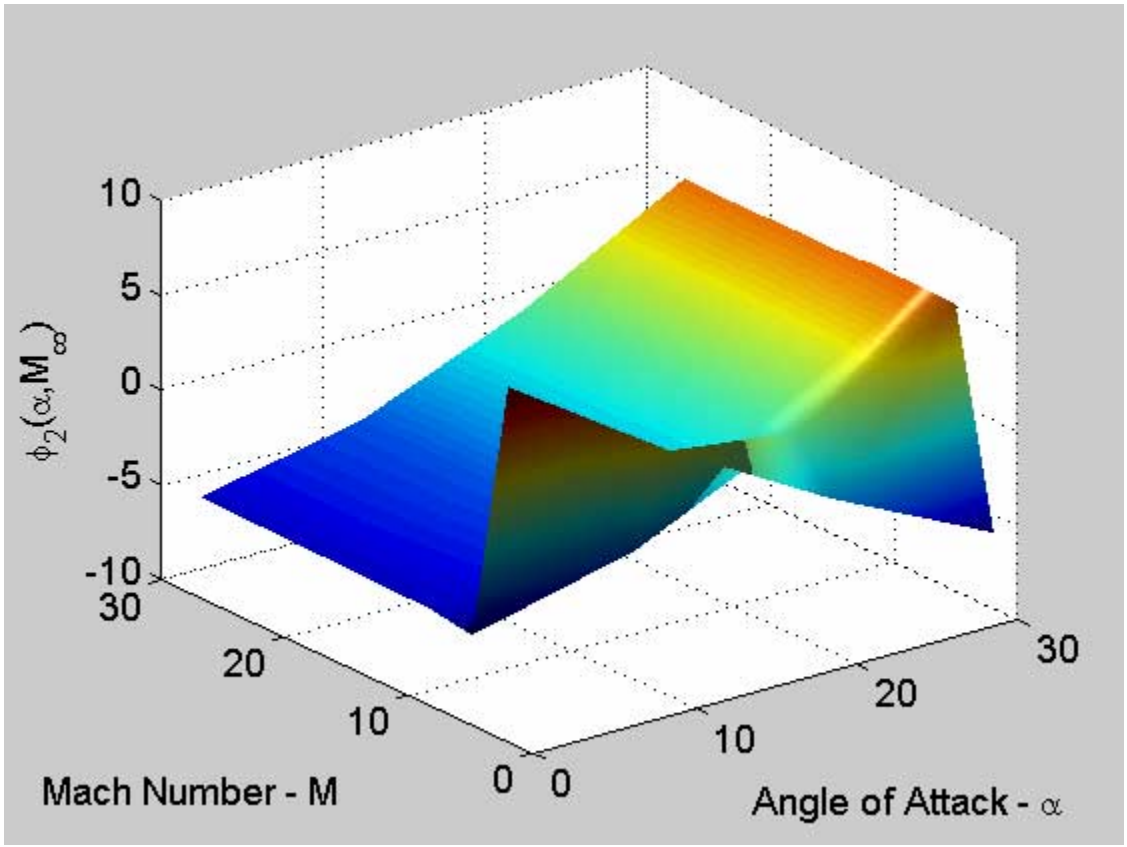
The output information consists of the following items:

(1) Response surface data of Cp and velocities for POD analysis (Tecplot files).
(2) C_p and temperature data at specified times (Tecplot files).
(3) Schematic plotting of trajectory related thermal quantities versus time over every patch. These quantities include enthalpy-based heat transfer coefficient, adiabatic wall enthalpy, and pressure.
(4) Optimal thickness of each design layer and the ratio of the final objective function to that computed using the initial thickness.
(5) Schematic plotting of optimal thickness and maximum temperature over each layer for every patch.
(6) Optimal thickness data of each layer of each panel (Tecplot file).

5.6 Results

The output items listed in Section 5.5 have been stored in a ASCII text file and some plotting files. The test file is the Standard Output File (MICRO_X_TPS.OUT) which includes all the input information appearing in the Standard Input File (MICRO_X_TPS.INP) and items (3)-(5) listed in the above section. Figures 5.4-5.7 show the Response surfaces of C_p, C_p and temperature plottings at a specified time in the trajectory bulk data card, and the optimal thickness, respectively.


0
-5
-10
-15
-20
$\phi_1(\alpha,M_\infty)$
30
20
10
0
Mach Number - M
0
10
20
30
Angle of Attack - α


10
5
0
-5
-10
$\phi_2(\alpha,M_\infty)$
30
20
10
0
Mach Number - M
0
10
20
30
Angle of Attack - α

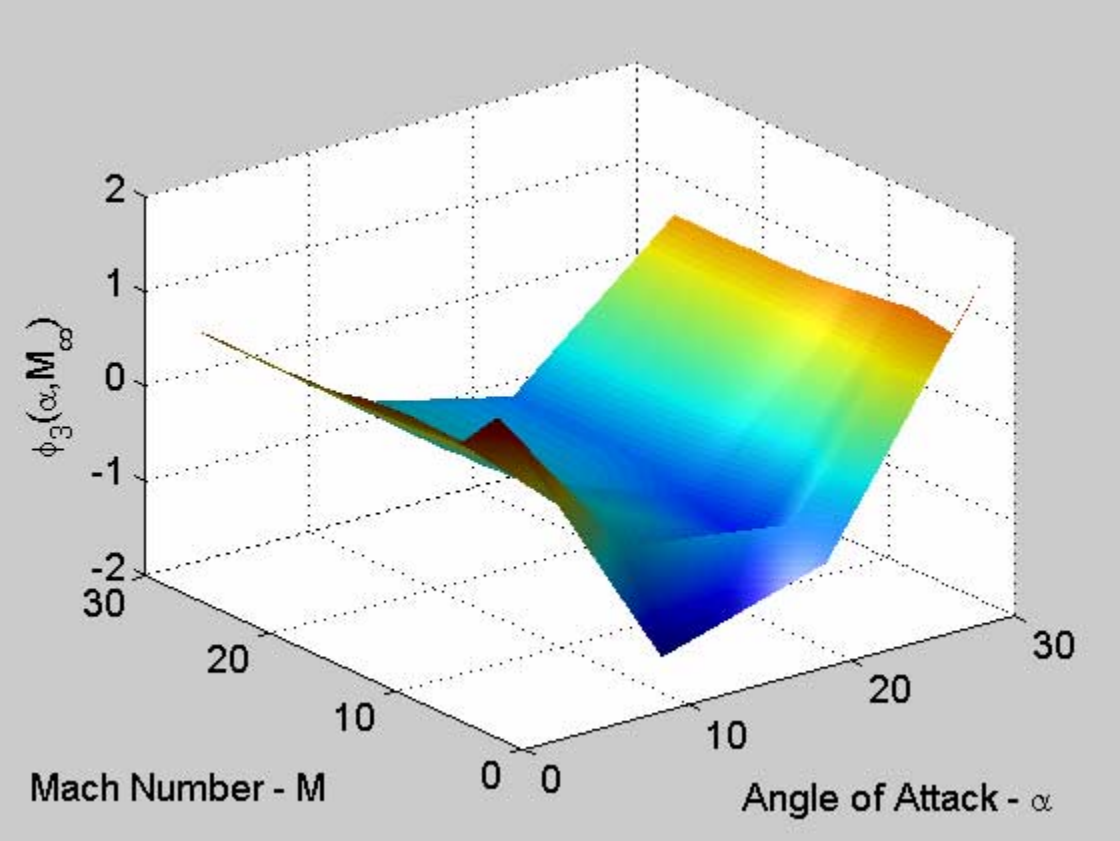


Figure 5.4. Response surfaces of the first three modes in POD analysis

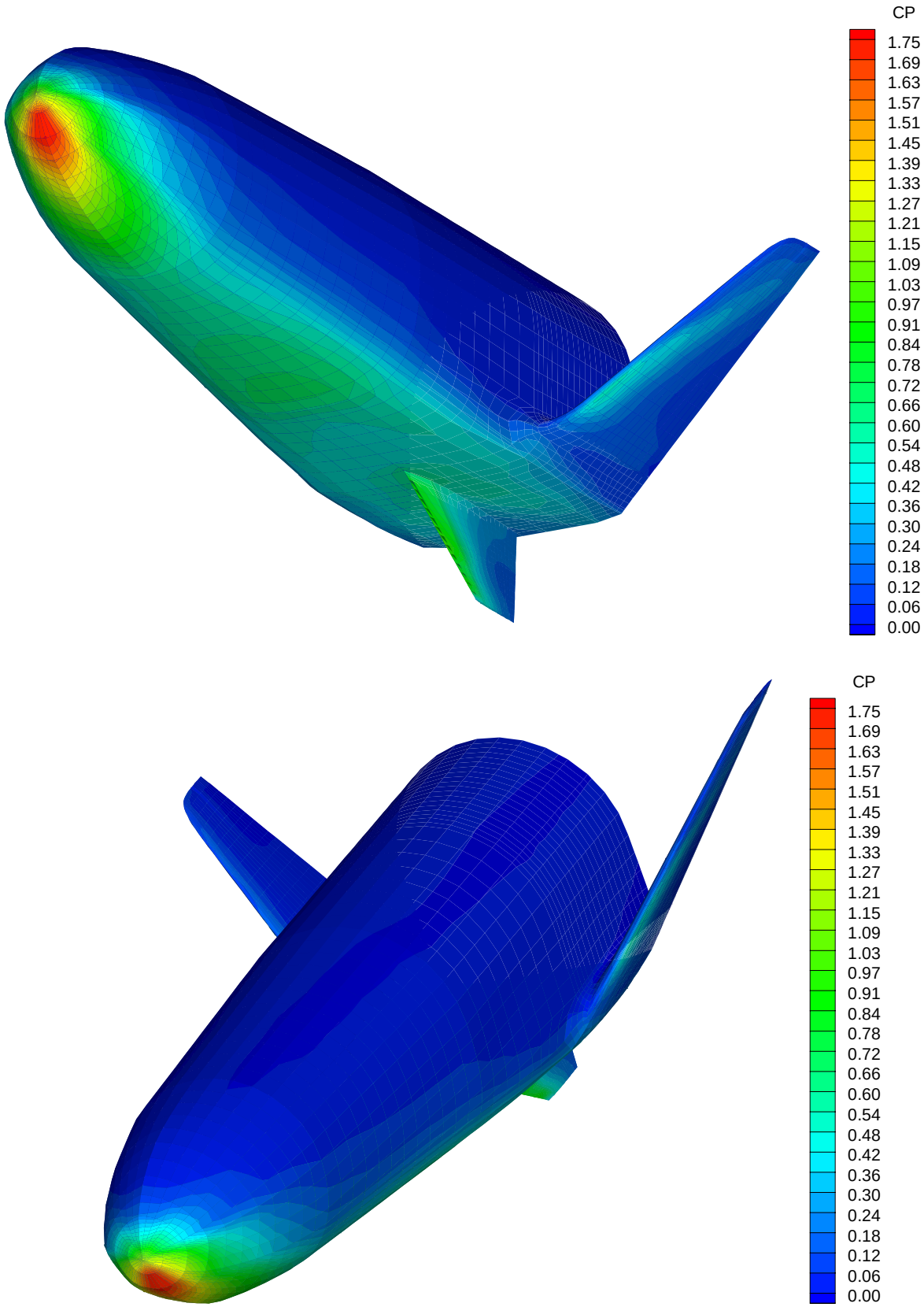


Figure 5.5. Plots of C_p at time=990 with M=21.7 and AoA=30^o

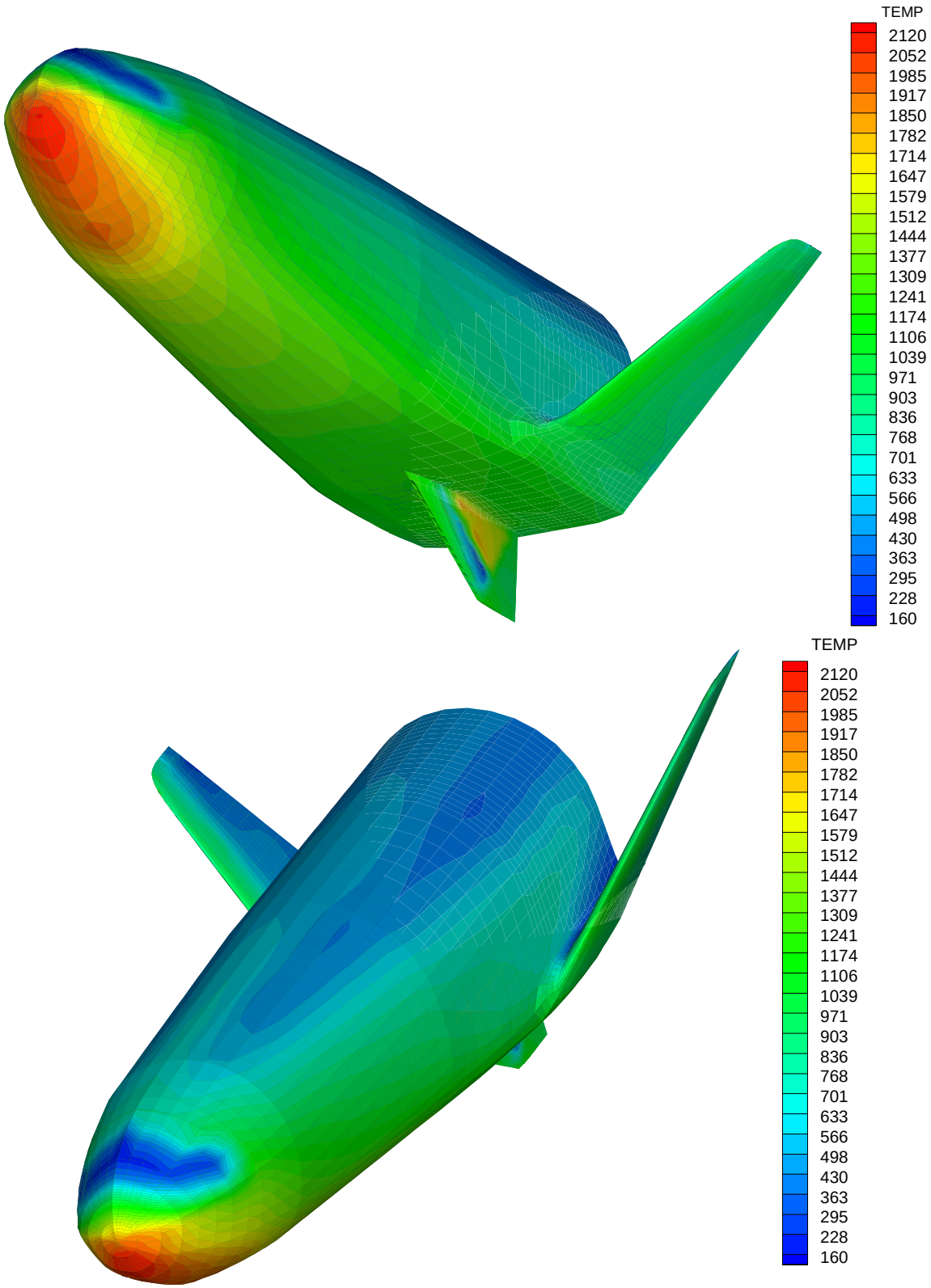
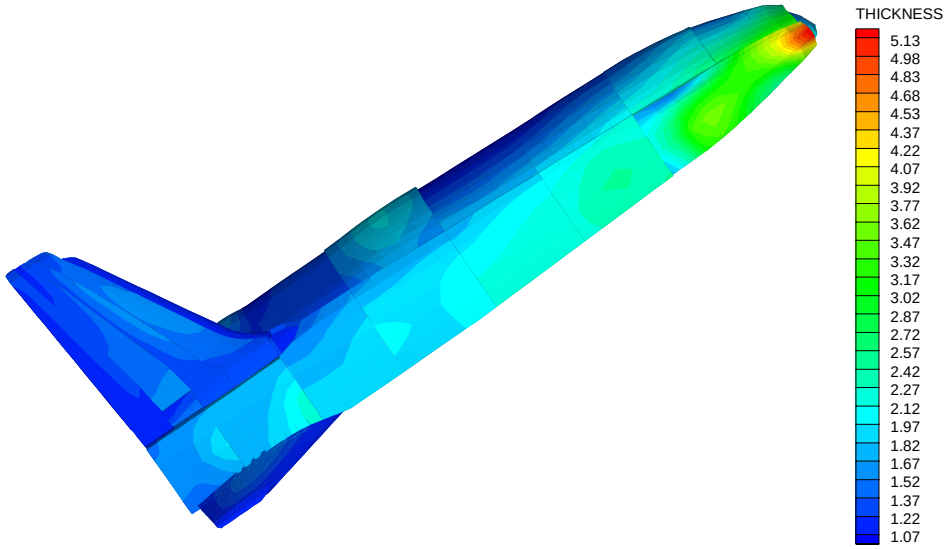
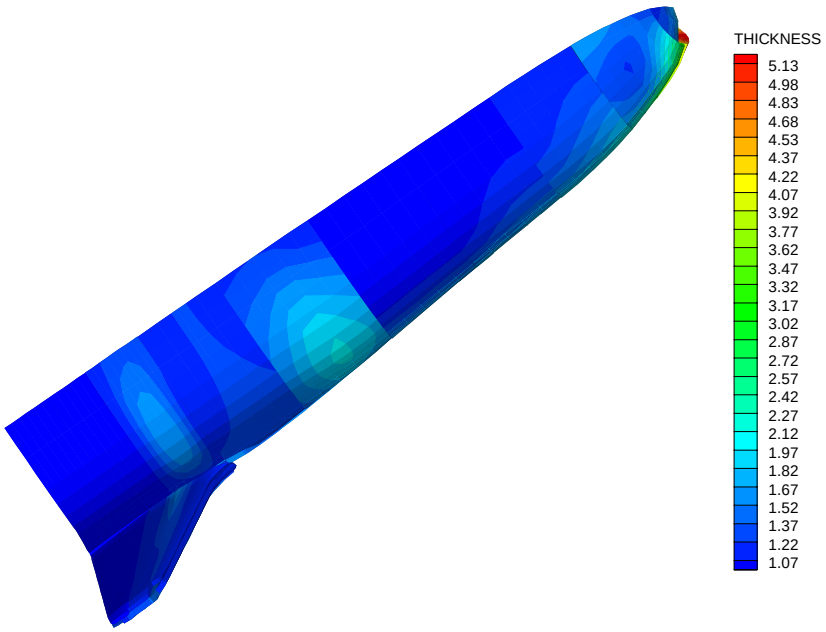


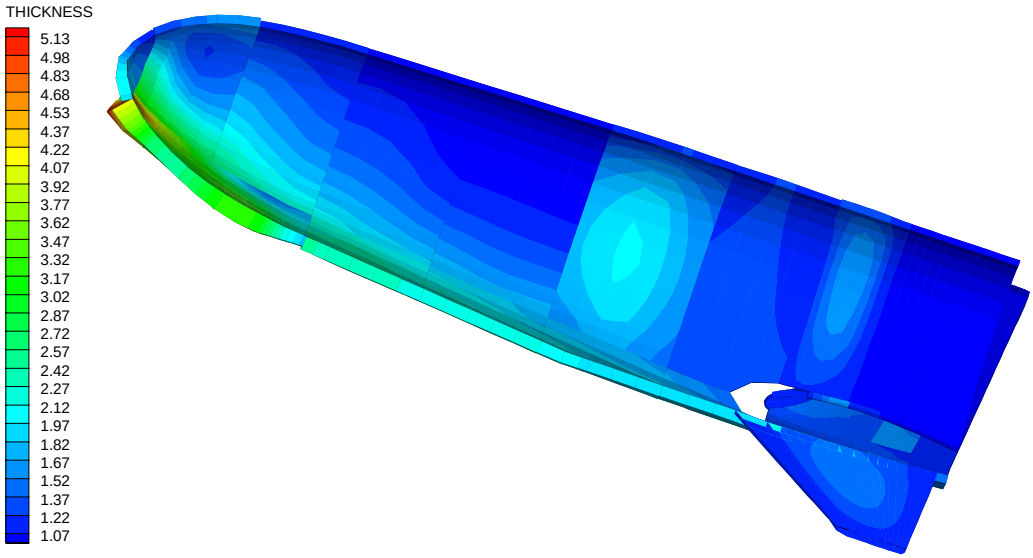
Figure 5.6. Plots of temperature at time=990 with M=21.7 and AoA=30^{o}



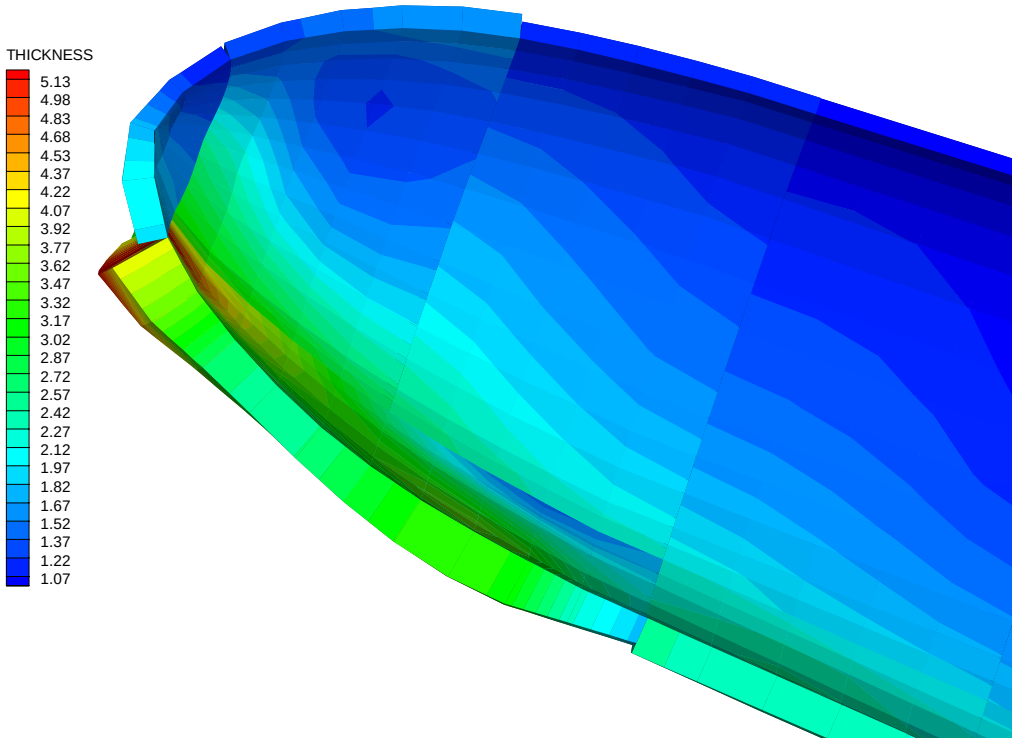
Windward surface



Leeward surface



Intersection view through middle vertical line



Enlargened intersection view

Figure 5.7. Optimal thickness plot (Thickness scaling factor=2.5)

5.7 Lists of Input and Output Files

Listing 5.1 Standard input File: MICRO_X_TPS.INP

```
ASSIGN AEROBASE='CTRTABLE.DAT',PRINT=0
$ Begin Executive Control Section
CEND
ECHO = SORT
SUBCASE = 1
        SUBTITLE=TPS OPTIMISATION FOR MICRO-X
        LABEL= HYPERSONIC AERODYNAMIC ANALYSIS
        TPSDES=1
$
BEGIN BULK
$
$ PLOTTING AERODYNAMIC MODEL
PLTAERO 1       YES     NO              TECPLOT MICRO_X_GEO.PLT
PLTAERO 1       YES     NO              NASTRAN MICRO_X_GEO.NAS
$ POLTTING TPS THICKNESS
PLTTPS   1      1       ALL     TECPLOT MICRO_X_HT.PLT  0.05
PLTTPS  -2      1       ALL     TECPLOT MICRO_X_HT1.PLT -2.5
$
$TPSDES SETID   PODRSM  TRJLST  IFPREH  IDFEM/TPSSYM                            CONT
TPSDES  1       1       1       2                                               CONT
CONT    1       2       30      4       5       6       7       8       CONT
CONT    9       10      11      12      13      14      15      16      CONT
CONT    17      18      19      20      21      22      23      24      CONT
CONT    25      26      27      28      29
$PODRSM |TPSDES |METHOD |NRDMOD |TOLER  |NEURON |SAVE   |FILENM
PODRSM  1       1                              ACQU    MICRO-X1.RST   CONT
CONT    CPPODRSM.P3D    UPODRSM.P3D      VPODRSM.P3D     WPODRSM.P3D
$
$       THERMAL STRUCTURES FOR NOSE SECTION
STTYPE  11       6      256                                                     CONT
CONT    0.03
STTYPE  12       2      129     129                                             CONT
CONT    0.03     0.03   0.5
STTYPE  13       1      225                                                     CONT
CONT    2.0
STTYPE  14       6      245                                                     CONT
CONT    0.008
STTYPE  15       1      247                                                     CONT
CONT    0.16
STTYPE  21       6      221                                                     CONT
CONT    0.05
STTYPE  22       1      225                                                     CONT
CONT    3.0
STTYPE  23       6      245                                                     CONT
CONT    0.008
STTYPE  24       1      247                                                     CONT
CONT    0.16
STTYPE  42       1      224                                                     CONT
CONT    3.0
$TPSSYM SETID   IDPATCH NLAYER
TPSSYM  1        1      5       4                                               CONT
CONT    1        11     0.01    2.                                              CONT
CONT    1        12     0.01    1.28333                                         CONT
CONT    1        13     1.0     10.                                             CONT
CONT    1        14     0.001   1.28333                                         CONT
CONT    1        15     0.05    1.28333
TPSSYM  2        2      4       4                                               CONT
CONT    2        21     0.01    2.                                              CONT
CONT    2        22     1.      10.                                             CONT
CONT    2        23     0.001   1.5                                             CONT
CONT    2        24     0.05    1.28333
TPSSYM  4        4      4       4                                               CONT
CONT    4        21     0.01    2.                                              CONT
```

```
CONT    4       42      1.0     10.                                     CONT
CONT    4       23      0.001   1.5                                     CONT
CONT    4       24      0.05    1.4
TPSSYM  5       5       4       4                                       CONT
CONT    5       21      0.01    2.                                      CONT
CONT    5       42      1.0     10.                                     CONT
CONT    5       23      0.001   1.5                                     CONT
CONT    5       24      0.05    1.4
TPSSYM  6       6       4       4                                       CONT
CONT    6       21      0.01    2.                                      CONT
CONT    6       42      1.0     10.                                     CONT
CONT    6       23      0.001   1.5                                     CONT
CONT    6       24      0.05    1.4
TPSSYM  7       7       4       4                                       CONT
CONT    7       21      0.01    2.                                      CONT
CONT    7       42      1.0     10.                                     CONT
CONT    7       23      0.001   1.5                                     CONT
CONT    7       24      0.05    1.4
TPSSYM  8       8       4       4                                       CONT
CONT    8       21      0.01    2.                                      CONT
CONT    8       42      1.0     10.                                     CONT
CONT    8       23      0.001   1.5                                     CONT
CONT    8       24      0.05    1.4
TPSSYM  9       9       4       4                                       CONT
CONT    9       21      0.01    2.                                      CONT
CONT    9       42      1.0     10.                                     CONT
CONT    9       23      0.001   1.5                                     CONT
CONT    9       24      0.05    1.4
TPSSYM  10      10      5       4                                       CONT
CONT    10      11      0.01    2.                                      CONT
CONT    10      12      0.01    1.28333                                 CONT
CONT    10      13      1.0     10.                                     CONT
CONT    10      14      0.001   1.28333                                 CONT
CONT    10      15      0.05    1.28333
TPSSYM  11      11      4       4                                       CONT
CONT    11      21      0.01    2.                                      CONT
CONT    11      42      1.0     10.                                     CONT
CONT    11      23      0.001   1.5                                     CONT
CONT    11      24      0.05    1.4
TPSSYM  12      12      4       4                                       CONT
CONT    12      21      0.01    2.                                      CONT
CONT    12      42      1.0     10.                                     CONT
CONT    12      23      0.001   1.5                                     CONT
CONT    12      24      0.05    1.4
TPSSYM  13      13      4       4                                       CONT
CONT    13      21      0.01    2.                                      CONT
CONT    13      42      1.0     10.                                     CONT
CONT    13      23      0.001   1.5                                     CONT
CONT    13      24      0.05    1.4
TPSSYM  14      14      4       4                                       CONT
CONT    14      21      0.01    2.                                      CONT
CONT    14      42      1.0     10.                                     CONT
CONT    14      23      0.001   1.5                                     CONT
CONT    14      24      0.05    1.4
TPSSYM  15      15      4       4                                       CONT
CONT    15      21      0.01    2.                                      CONT
CONT    15      42      1.0     10.                                     CONT
CONT    15      23      0.001   1.5                                     CONT
CONT    15      24      0.05    1.4
TPSSYM  16      16      4       4                                       CONT
CONT    16      21      0.01    2.                                      CONT
CONT    16      42      1.0     10.                                     CONT
CONT    16      23      0.001   1.5                                     CONT
CONT    16      24      0.05    1.4
TPSSYM  17      17      4       4                                       CONT
CONT    17      21      0.01    2.                                      CONT
CONT    17      42      1.0     10.                                     CONT
CONT    17      23      0.001   1.5                                     CONT
CONT    17      24      0.05    1.4
TPSSYM  18      18      4       4                                       CONT
CONT    18      21      0.01    2.                                      CONT
```

```
CONT    18       42     1.0     10.                                    CONT
CONT    18       23     0.001   1.5                                    CONT
CONT    18       24     0.05    1.4
TPSSYM  19       19     4       4                                      CONT
CONT    19       21     0.01    2.                                     CONT
CONT    19       42     1.0     10.                                    CONT
CONT    19       23     0.001   1.5                                    CONT
CONT    19       24     0.05    1.4
TPSSYM  20       20     4       4                                      CONT
CONT    20       21     0.01    2.                                     CONT
CONT    20       42     1.0     10.                                    CONT
CONT    20       23     0.001   1.5                                    CONT
CONT    20       24     0.05    1.4
TPSSYM  21       21     4       4                                      CONT
CONT    21       21     0.01    2.                                     CONT
CONT    21       42     1.0     10.                                    CONT
CONT    21       23     0.001   1.5                                    CONT
CONT    21       24     0.05    1.4
TPSSYM  22       22     4       4                                      CONT
CONT    22       21     0.01    2.                                     CONT
CONT    22       42     1.0     10.                                    CONT
CONT    22       23     0.001   1.5                                    CONT
CONT    22       24     0.05    1.4
TPSSYM  23       23     4       4                                      CONT
CONT    23       21     0.01    2.                                     CONT
CONT    23       42     1.0     10.                                    CONT
CONT    23       23     0.001   1.5                                    CONT
CONT    23       24     0.05    1.4
$
TPSSYM  24       24     4       4                                      CONT
CONT    24       21     0.01    2.                                     CONT
CONT    24       42     1.0     10.                                    CONT
CONT    24       23     0.001   1.5                                    CONT
CONT    24       24     0.05    1.4
TPSSYM  25       25     4       4                                      CONT
CONT    25       21     0.01    2.                                     CONT
CONT    25       42     1.0     10.                                    CONT
CONT    25       23     0.001   1.5                                    CONT
CONT    25       24     0.05    1.4
TPSSYM  26       26     4       4                                      CONT
CONT    26       21     0.01    2.                                     CONT
CONT    26       42     1.0     10.                                    CONT
CONT    26       23     0.001   1.5                                    CONT
CONT    26       24     0.05    1.4
TPSSYM  27       27     4       4                                      CONT
CONT    27       21     0.01    2.                                     CONT
CONT    27       42     1.0     10.                                    CONT
CONT    27       23     0.001   1.5                                    CONT
CONT    27       24     0.05    1.4
TPSSYM  28       28     4       4                                      CONT
CONT    28       21     0.01    2.                                     CONT
CONT    28       42     1.0     10.                                    CONT
CONT    28       23     0.001   1.5                                    CONT
CONT    28       24     0.05    1.4
TPSSYM  29       29     5       4                                      CONT
CONT    29       11     0.01    2.                                     CONT
CONT    29       12     0.01    1.28333                                CONT
CONT    29       13     1.0     10.                                    CONT
CONT    29       14     0.001   1.28333                                CONT
CONT    29       15     0.05    1.28333
TPSSYM  30       30     5       4                                      CONT
CONT    30       11     0.01    2.                                     CONT
CONT    30       12     0.01    1.28333                                CONT
CONT    30       13     1.0     10.                                    CONT
CONT    30       14     0.001   1.28333                                CONT
CONT    30       15     0.05    1.28333
$
PRVAL   4
$
$PATCH  ID      RHSPAN  RHSHOT  SYMY    YVAL    TIMESP
PATCH   1        1       101
```

```
$
$ ALL PANELS for Patch  1
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2        1              1       2       3       4      50      60+PN1101
+PN1101       70      80      90     100     110     120     130     140+PN1102
+PN1102      150     160     170     180     190     200     201     202+PN1103
+PN1103      203     204     205     206     207     208     209     210+PN1104
+PN1104      211     212     213     214     215     216     217     218+PN1105
+PN1105      219     220
$
$ DESVAR for Patch  1
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
DESVAR         1       2       3
             130     201
              90     209
               4     220
$ HOT PANELS FOR Patch 1
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2      101             130     201      90     209       4     220 CONT
CONT         170
$
PATCH   2        2       102
$
$ PANLST2 for Patch  2 (+3)
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2        2              5       6       7       8       9      10+PN1201
+PN1201       11      12      13      14      15      16      17      18+PN1202
+PN1202       19      20      21      22      23      24      65      66+PN1203
+PN1203       67      68      69      75      76      77      78      79 CONT
CONT          25      26      27      28      29      30      31      32 CONT
CONT          33      34      35      36      37      38      39      40 CONT
CONT          61      62      63      64      71      72      73      74 CONT
CONT         365     377     413     425     437     449
$
$ DESVAR for Patch  2
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
DESVAR         2       3       4                                          CONT
CONT           8       6      69                                          CONT
CONT          20      18      66                                          CONT
CONT          32      30      63                                          CONT
CONT         413     437     377
$
PATCH   4        4       104                     1
$
$ PANLST2 for Patch  4
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2        4             366     367     368     369     370     378+PN1401
+PN1401      379     380     381     382     414     415     416     417+PN1402
+PN1402      418     426     427     428     429     430     438     439+PN1403
+PN1403      440     441     442     450     451     452     453     454
$
$ DESVAR for Patch  4
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
DESVAR         4       3       3                                         +DE1401
+DE1401      418     416     414                                         +DE1402
+DE1402      442     440     438                                         +DE1403
+DE1403      382     380     378
PATCH   5        5       105                     1
$
$ PANLST2 for Patch  5
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2        5             371     372     373     374     375     383+PN1501
+PN1501      384     385     386     387     419     420     421     422+PN1502
+PN1502      423     431     432     433     434     435     443     444+PN1503
+PN1503      445     446     447     455     456     457     458     459
$
$ DESVAR for Patch  5
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
DESVAR         5       3       3                                         +DE1501
+DE1501      423     421     419                                         +DE1502
+DE1502      447     445     443                                         +DE1503
```

```
+DE1503      387     385     383
$
PATCH   6        6       106                     1
$
$ PANLST2 for Patch  6
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2        6             376     388     424     436     448     460+PN1601
+PN1601      511     512     515     516     519     520     523     524+PN1602
+PN1602     1937    1938    1939    1940    1941    1942    1943    1944+PN1603
+PN1603     1945    1946    1947    1948    1949    1950    1951    1952
$ DESVAR for Patch  6
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
DESVAR         6       3       3                                          +DE1601
+DE1601     1949    1951     424                                          +DE1602
+DE1602     1941    1943     448                                          +DE1603
+DE1603      523     515     388
PATCH   7        7       107                     1
$
$ PANLST2 for Patch  7
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2        7             613     614     615     616     617     618+PN1701
+PN1701      619     620     621     622     623     624     625     626+PN1702
+PN1702      627     628     629     630     631     632     633     634+PN1703
+PN1703      635     636    1936
$
$ DESVAR for Patch  7
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
DESVAR         7       3       3                                          +DE1701
+DE1701      633     635     636                                          +DE1702
+DE1702      625     627     628                                          +DE1703
+DE1703      613     615     616
PATCH   8        8       108                     1
$
$ PANLST2 for Patch  8
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2        8            1174    1175    1176    1177    1178    1179+PN1801
+PN1801     1180    1181    1182    1183    1184    1185    1186    1187+PN1802
+PN1802     1188    1189    1190    1191    1192    1193    1194    1195+PN1803
+PN1803     1196    1197    1198    1199    1200    1201
$
$ DESVAR for Patch  8
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
DESVAR         8       3       3                                          +DE1801
+DE1801     1195    1198    1201                                          +DE1802
+DE1802     1181    1184    1187                                          +DE1803
+DE1803     1174    1177    1180
PATCH   9        9       109                     1
$
$ PANLST2 for Patch  9
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2        9            1886    1887    1888    1889    1890    1891+PN1901
+PN1901     1892    1893    1894    1895    1896    1897    1898    1899+PN1902
+PN1902     1900    1901    1902    1903    1904    1905    1906    1907+PN1903
+PN1903     1908    1909    1910    1911    1912    1913    1914    1915+PN1904
+PN1904     1916    1917
$
$ DESVAR for Patch  9
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
DESVAR         9       3       3                                          +DE1901
+DE1901     1910    1914    1917                                          +DE1902
+DE1902     1894    1898    1901                                          +DE1903
+DE1903     1886    1890    1893
PATCH   10       10      110                     1
$
$ PANLST2 for Patch 10
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2       10             661     662     663     664     665     666+CON
+CON         667     668     669     670     671     672     673     674+CON
+CON         675     676     677     678     679     680    1001    1002+CON
+CON        1003    1004    1005    1006    1007    1008    1009    1010+CON
+CON        1011    1012    1013    1014    1015    1016    1017    1018+CON
```

```
+CON        1019    1020    1021    1022    1023    1024    1025    1026+CON
+CON        1027    1028    1029    1030    1031    1032    1033    1034+CON
+CON        1035    1036    1037    1038    1039    1040    1290    1291+CON
+CON        1292    1293    1294    1295    1296    1297    1298    1299+CON
+CON        1300    1301    1302    1303    1304    1305
$
$ DESVAR for Patch 10
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
DESVAR        10       4       4                                        +DE2001
+DE2001     1290    1291    1292    1293                                +DE2002
+DE2002     1017    1018    1019    1020                                +DE2003
+DE2003     1037    1038    1039    1040                                +DE2004
+DE2004      677     678     679     680
$
PATCH   29       29      129                     1
$ DESVAR for Patch 29
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
DESVAR        29       4       4                                        +DE2001
+DE2001     1273    1272    1271    1270                                +DE2002
+DE2002      840     850     860     870                                +DE2003
+DE2003      835     845     855     865                                +DE2004
+DE2004      697     698     699     700
$ PANLST2 for Patch 29
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2       29             681     682     683     684     685     686+CON
+CON          687     688     689     690     691     692     693     694+CON
+CON          695     696     697     698     699     700     835     836+CON
+CON          837     838     839     840     841     842     843     844+CON
+CON          845     846     847     848     849     850     851     852+CON
+CON          853     854     855     856     857     858     859     860+CON
+CON          861     862     863     864     865     866     867     868+CON
+CON          869     870     871     872     873     874    1258    1259+CON
+CON         1260    1261    1262    1263    1264    1265    1266    1267+CON
+CON         1268    1269    1270    1271    1272    1273
PATCH   30       30      130                     1
$ DESVAR for Patch 30
DESVAR        30       3       3                                        +DE2001
+DE2001 10210   10201   10196                                           +DE2002
+DE2002 10105   10096   10091                                           +DE2003
+DE2003 10015   10006   10001
$ PANLST2 for Patch 30
PANLST2      30             10001   10002   10003   10004   10005   10006+CON
+CON        10007   10008   10009   10010   10011   10012   10013   10014+CON
+CON        10015   10016   10017   10018   10019   10020   10021   10022+CON
+CON        10023   10024   10025   10026   10027   10028   10029   10030+CON
+CON        10031   10032   10033   10034   10035   10036   10037   10038+CON
+CON        10039   10040   10041   10042   10043   10044   10045   10046+CON
+CON        10047   10048   10049   10050   10051   10052   10053   10054+CON
+CON        10055   10056   10057   10058   10059   10060   10061   10062+CON
+CON        10063   10064   10065   10066   10067   10068   10069   10070+CON
+CON        10071   10072   10073   10074   10075   10076   10077   10078+CON
+CON        10079   10080   10081   10082   10083   10084   10085   10086+CON
+CON        10087   10088   10089   10090   10091   10092   10093   10094+CON
+CON        10095   10096   10097   10098   10099   10100   10101   10102+CON
+CON        10103   10104   10105   10106   10107   10108   10109   10110+CON
+CON        10111   10112   10113   10114   10115   10116   10117   10118+CON
+CON        10119   10120   10121   10122   10123   10124   10125   10126+CON
+CON        10127   10128   10129   10130   10131   10132   10133   10134+CON
+CON        10135   10136   10137   10138   10139   10140   10141   10142+CON
+CON        10143   10144   10145   10146   10147   10148   10149   10150+CON
+CON        10151   10152   10153   10154   10155   10156   10157   10158+CON
+CON        10159   10160   10161   10162   10163   10164   10165   10166+CON
+CON        10167   10168   10169   10170   10171   10172   10173   10174+CON
+CON        10175   10176   10177   10178   10179   10180   10181   10182+CON
+CON        10183   10184   10185   10186   10187   10188   10189   10190+CON
+CON        10191   10192   10193   10194   10195   10196   10197   10198+CON
+CON        10199   10200   10201   10202   10203   10204   10205   10206+CON
+CON        10207   10208   10209   10210   10421   10422   10423   10424+CON
+CON        10425   10426   10427   10428   10429   10430   10431   10432+CON
+CON        10433   10434   10435
$
```

```
PATCH   11      11      111                     1
$ PANLST2 for Patch 11
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2       11            1071    1072    1073    1074    1075    1076+PN2101
+PN2101     1077    1078    1079    1080    1081    1082    1083    1084+PN2102
+PN2102     1085    1086    1087    1088    1089    1090    1091    1092+PN2103
+PN2103     1093    1094    1095    1096    1097    1098    1099    1100+PN2104
+PN2104     1101    1102    1103    1104    1105    1106    1107    1108+PN2105
+PN2105     1109    1110    1126    1127    1128    1129    1130    1131+PN2106
+PN2106     1132    1133    1134    1135    1136    1137    1138    1139+PN2107
+PN2107     1140    1141    1142    1143    1144    1145    1158    1159+PN2108
+PN2108     1160    1161    1162    1163    1164    1165    1166    1167+PN2109
+PN2109     1168    1169    1170    1171    1172    1173    1348    1349+PN2110
+PN2110     1350    1351    1355    1356    1357    1358    1362    1363+PN2111
+PN2111     1364    1365    1369    1370    1371    1372    1376    1377+PN2112
+PN2112     1378    1379    1383    1384    1385    1386
$
$ DESVAR for Patch 11
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
DESVAR        11       3       3                                       +DE2101
+DE2101     1383    1385    1386                                       +DE2102
+DE2102     1107    1087    1077                                       +DE2103
+DE2103     1141    1131    1126
PATCH   12      12      112                     1
$
$ PANLST2 for Patch 12
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2       12            1041    1042    1043    1044    1045    1046+PN2201
+PN2201     1047    1048    1049    1050    1051    1052    1053    1054+PN2202
+PN2202     1055    1056    1057    1058    1059    1060    1061    1062+PN2203
+PN2203     1063    1064    1065    1066    1067    1068    1069    1070+PN2204
+PN2204     1111    1112    1113    1114    1115    1116    1117    1118+PN2205
+PN2205     1119    1120    1121    1122    1123    1124    1125    1146+PN2206
+PN2206     1147    1148    1149    1150    1151    1152    1153    1154+PN2207
+PN2207     1155    1156    1157    1352    1353    1354    1359    1360+PN2208
+PN2208     1361    1366    1367    1368    1373    1374    1375    1380+PN2209
+PN2209     1381    1382    1387    1388    1389
$
$ DESVAR for Patch 12
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
DESVAR        12       3       3                                       +DE2201
+DE2201     1387    1388    1389                                       +DE2202
+DE2202     1067    1057    1047                                       +DE2203
+DE2203     1121    1116    1111
$
PATCH   13      13      113
$ PANLST2 for Patch 13
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2       13            1686    1687    1688    1689    1694    1695+CON
+CON        1696    1697    1702    1703    1704    1705    1710    1711+CON
+CON        1712    1713    1718    1719    1720    1721    1726    1727+CON
+CON        1728    1729    1734    1735    1736    1737    1742    1743+CON
+CON        1744    1745    1750    1751    1752    1753    1758    1759+CON
+CON        1760    1761    1766    1767    1768    1769    1774    1775+CON
+CON        1776    1777    1782    1783    1784    1785    1790    1791+CON
+CON        1792    1793    1798    1799    1800    1801    1806    1807+CON
+CON        1808    1809    1814    1815    1816    1817    1822    1823+CON
+CON        1824    1825    1830    1831    1832    1833    1838    1839+CON
+CON        1840    1841    1846    1847    1848    1849
$
$ DESVAR for Patch 13
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
DESVAR        13       3       3                                       +DE2301
+DE2301     1806    1808    1809                                       +DE2302
+DE2302     1734    1736    1737                                       +DE2303
+DE2303     1814    1816    1817
PATCH   14      14      114                     1
$
$ PANLST2 for Patch 14
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2       14            1690    1691    1692    1693    1698    1699+PN2401
```

```
+PN2401     1700    1701    1706    1707    1708    1709    1714    1715+PN2402
+PN2402     1716    1717    1722    1723    1724    1725    1730    1731+PN2403
+PN2403     1732    1733    1738    1739    1740    1741    1746    1747+PN2404
+PN2404     1748    1749    1754    1755    1756    1757    1762    1763+PN2405
+PN2405     1764    1765    1770    1771    1772    1773    1778    1779+PN2406
+PN2406     1780    1781    1786    1787    1788    1789    1794    1795+PN2407
+PN2407     1796    1797    1802    1803    1804    1805    1810    1811+PN2408
+PN2408     1812    1813    1818    1819    1820    1821    1826    1827+PN2409
+PN2409     1828    1829    1834    1835    1836    1837    1842    1843+PN2410
+PN2410     1844    1845    1850    1851    1852    1853    1854    1855+PN2411
+PN2411     1856    1857    1862    1863    1864    1865    1870    1871+PN2412
+PN2412     1872    1873    1878    1879    1880    1881    1929    1930+PN2413
+PN2413     1931    1933
$
$ DESVAR for Patch 14
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
DESVAR        14       3       3                                          +DE2401
+DE2401     1810    1812    1813                                          +DE2402
+DE2402     1738    1740    1741                                          +DE2403
+DE2403     1818    1820    1821
PATCH   15       15      115                     1
$
$ PANLST2 for Patch 15
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2       15              45      46      47      48      49      55+PN2501
+PN2501       56      57      58      59      85      86      87      88+PN2502
+PN2502       89      95      96      97      98      99     105     106+PN2503
+PN2503      107     108     109     115     116     117     118     119+PN2504
+PN2504      125     126     127     128     129     135     136     137+PN2505
+PN2505      138     139     145     146     147     148     149     155+PN2506
+PN2506      156     157     158     159     165     166     167     168+PN2507
+PN2507      169     175     176     177     178     179     185     186+PN2508
+PN2508      187     188     189     195     196     197     198     199
$
$ DESVAR for Patch 15
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
DESVAR        15       3       3                                          +DE2501
+DE2501       55      57      59                                          +DE2502
+DE2502      195     197     199                                          +DE2503
+DE2503      125     127     129
$
PATCH   16       16      116                     1
$
$ PANLST2 for Patch 16
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2       16              41      42      43      44      51      52+PN2601
+PN2601       53      54      81      82      83      84      91      92+PN2602
+PN2602       93      94     101     102     103     104     111     112+PN2603
+PN2603      113     114     121     122     123     124     131     132+PN2604
+PN2604      133     134     141     142     143     144     151     152+PN2605
+PN2605      153     154     161     162     163     164     171     172+PN2606
+PN2606      173     174     181     182     183     184     191     192+PN2607
+PN2607      193     194     309     310     311     312     313     314+PN2608
+PN2608      315     316     317     329     341     353     389     401
$ DESVAR for Patch 16
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
DESVAR        16       3       3                                          +DE2601
+DE2601      389      52      54                                          +DE2602
+DE2602      309     192     194                                          +DE2603
+DE2603      316     122     124
PATCH   17       17      117                     1
$
$ PANLST2 for Patch 17
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2       17              269     270     271     272     273     274+PN2701
+PN2701      275     276     277     278     279     280     281     282+PN2702
+PN2702      283     284     285     286     287     288     289     290+PN2703
+PN2703      291     292     293     294     295     296     297     298+PN2704
+PN2704      299     300     301     302     303     304     305     306+PN2705
+PN2705      307     308     318     319     320     321     322     330+PN2706
+PN2706      331     332     333     334     342     343     344     345+PN2707
```

```
+PN2707      346     354     355     356     357     358     390     391+PN2708
+PN2708      392     393     394     402     403     404     405     406
$
$ DESVAR for Patch 17
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
DESVAR        17       3       3                                          +DE2701
+DE2701      394     392     390                                          +DE2702
+DE2702      269     285     301                                          +DE2703
+DE2703      276     292     308
$
PATCH   18       18      118                     1
$
$ PANLST2 for Patch 18
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2       18             229     230     231     232     233     234+PN2801
+PN2801      235     236     237     238     239     240     241     242+PN2802
+PN2802      243     244     245     246     247     248     249     250+PN2803
+PN2803      251     252     253     254     255     256     257     258+PN2804
+PN2804      259     260     261     262     263     264     265     266+PN2805
+PN2805      267     268     323     324     325     326     327     335+PN2806
+PN2806      336     337     338     339     347     348     349     350+PN2807
+PN2807      351     359     360     361     362     363     395     396+PN2808
+PN2808      397     398     399     407     408     409     410     411
$ DESVAR for Patch 18
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
DESVAR        18       3       3                                          +DE2801
+DE2801      399     397     395                                          +DE2802
+DE2802      229     245     261                                          +DE2803
+DE2803      236     252     268
PATCH   19       19      119                     1
$
$ PANLST2 for Patch 19
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2       19             221     222     223     224     225     226+PN2901
+PN2901      227     228     328     340     352     364     400     412+PN2902
+PN2902      461     462     463     464     465     466     467     468+PN2903
+PN2903      469     470     471     472     473     474     475     476+PN2904
+PN2904      477     478     479     480     481     482     483     484+PN2905
+PN2905      485     486     487     488     489     490     491     492+PN2906
+PN2906      493     494     495     496     497     498     499     500+PN2907
+PN2907      501     502     503     504     505     506     507     508+PN2908
+PN2908      509     510     513     514     517     518     521     522
$
$ DESVAR for Patch 19
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
DESVAR        19       3       3                                          +DE2901
+DE2901      522     514     400                                          +DE2902
+DE2902      461     477     221                                          +DE2903
+DE2903      468     484     228
PATCH   20       20      120                     1
$
$ PANLST2 for Patch 20
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2       20             557     558     559     560     561     562+PN3001
+PN3001      563     564     565     566     567     568     569     570+PN3002
+PN3002      571     572     573     574     575     576     577     578+PN3003
+PN3003      579     580     581     582     583     584     585     586+PN3004
+PN3004      587     588     589     590     591     592     593     594+PN3005
+PN3005      595     596     597     598     599     600     601     602+PN3006
+PN3006      603     604     605     606     607     608     609     610+PN3007
+PN3007      611     612
$
$ DESVAR for Patch 20
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
DESVAR        20       3       3                                          +DE3001
+DE3001      609     611     612                                          +DE3002
+DE3002      557     573     581                                          +DE3003
+DE3003      564     580     588
PATCH   21       21      121                     1
$
$ PANLST2 for Patch 21
```

```
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2       21             717     718     719     720     721     722+PN3101
+PN3101      723     724     725     726     727     728     729     730+PN3102
+PN3102      731     732     733     734     735     736     737     738+PN3103
+PN3103      739     740     741     742     743     744     745     746+PN3104
+PN3104      747     748     749     750     751     752     753     754+PN3105
+PN3105      755     756     757     758     759     760     761     762+PN3106
+PN3106      763     764     938     939     940     941     945     946+PN3107
+PN3107      947     948     952     953     954     955     959     960+PN3108
+PN3108      961     962    1205    1206    1207    1208    1212    1213+PN3109
+PN3109     1214    1215    1219    1220    1221    1222    1226    1227+PN3110
+PN3110     1228    1229    1233    1234    1235    1236    1240    1241+PN3111
+PN3111     1242    1243    1247    1248    1249    1250    1254    1255+PN3112
+PN3112     1256    1257
$
$ DESVAR for Patch 21
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
DESVAR        21       3       3                                          +DE3101
+DE3101      941     938     717                                          +DE3102
+DE3102     1254    1257     757                                          +DE3103
+DE3103     1205    1208     764
$
PATCH   22       22      122                     1
$
$ PANLST2 for Patch 22
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2       22             942     943     944     949     950     951+PN3201
+PN3201      956     957     958     963     964     965    1202    1203+PN3202
+PN3202     1204    1209    1210    1211    1216    1217    1218    1223+PN3203
+PN3203     1224    1225    1230    1231    1232    1237    1238    1239+PN3204
+PN3204     1244    1245    1246    1251    1252    1253    1590    1591+PN3205
+PN3205     1598    1599    1606    1607    1614    1615    1622    1623+PN3206
+PN3206     1630    1631    1638    1639    1646    1647    1654    1655+PN3207
+PN3207     1662    1663    1670    1671    1678    1679
$ DESVAR for Patch 22
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
DESVAR        22       3       3                                          +DE3201
+DE3201     1591     944     942                                          +DE3202
+DE3202     1623    1251    1253                                          +DE3203
+DE3203     1679    1202    1204
$
PATCH   23       23      123                     1
$
$ PANLST2 for Patch 23
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2       23            1592    1593    1594    1595    1596    1597+PN3301
+PN3301     1600    1601    1602    1603    1604    1605    1608    1609+PN3302
+PN3302     1610    1611    1612    1613    1616    1617    1618    1619+PN3303
+PN3303     1620    1621    1624    1625    1626    1627    1628    1629+PN3304
+PN3304     1632    1633    1634    1635    1636    1637    1640    1641+PN3305
+PN3305     1642    1643    1644    1645    1648    1649    1650    1651+PN3306
+PN3306     1652    1653    1656    1657    1658    1659    1660    1661+PN3307
+PN3307     1664    1665    1666    1667    1668    1669    1672    1673+PN3308
+PN3308     1674    1675    1676    1677    1680    1681    1682    1683+PN3309
+PN3309     1684    1685
$ DESVAR for Patch 23
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
DESVAR        23       3       3                                          +DE3301
+DE3301     1597    1594    1592                                          +DE3302
+DE3302     1629    1626    1624                                          +DE3303
+DE3303     1685    1683    1680
PATCH   24       24      124                     1
$
$ PANLST2 for Patch 24
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2       24             795     796     797     798     799     800+PN3401
+PN3401      801     802     803     804     805     806     807     808+PN3402
+PN3402      809     810     811     812     813     814     815     816+PN3403
+PN3403      817     818     819     820     821     822     823     824+PN3404
+PN3404      825     826     827     828     829     830     831     832+PN3405
+PN3405      833     834     875     876     877     878     882     883+PN3406
```

```
+PN3406      884     885     889     890     891     892     896     897+PN3407
+PN3407      898     899     903     904     905     906     910     911+PN3408
+PN3408      912     913     917     918     919     920     924     925+PN3409
+PN3409      926     927     931     932     933     934    1309    1310+PN3410
+PN3410     1311    1312    1316    1317    1318    1319    1323    1324+PN3411
+PN3411     1325    1326    1330    1331    1332    1333    1337    1338+PN3412
+PN3412     1339    1340    1344    1345    1346    1347
$
$ DESVAR for Patch 24
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
DESVAR        24       3       3                                          +DE3401
+DE3401      834     824     804                                          +DE3402
+DE3402      827     817     797                                          +DE3403
+DE3403     1347    1346    1344
$
PATCH   25       25      125                     1
$
$ PANLST2 for Patch 25
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2       25             765     766     767     768     769     770+PN3501
+PN3501      771     772     773     774     775     776     777     778+PN3502
+PN3502      779     780     781     782     783     784     785     786+PN3503
+PN3503      787     788     789     790     791     792     793     794+PN3504
+PN3504      879     880     881     886     887     888     893     894+PN3505
+PN3505      895     900     901     902     907     908     909     914+PN3506
+PN3506      915     916     921     922     923     928     929     930+PN3507
+PN3507      935     936     937    1306    1307    1308    1313    1314+PN3508
+PN3508     1315    1320    1321    1322    1327    1328    1329    1334+PN3509
+PN3509     1335    1336    1341    1342    1343
$ DESVAR for Patch 25
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
DESVAR        25       3       3                                          +DE3501
+DE3501      794     784     774                                          +DE3502
+DE3502      787     777     767                                          +DE3503
+DE3503     1343    1342    1341
PATCH   26       26      126                     1
$
$ PANLST2 for Patch 26
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2       26            1394    1395    1396    1397    1402    1403+PN3601
+PN3601     1404    1405    1410    1411    1412    1413    1418    1419+PN3602
+PN3602     1420    1421    1426    1427    1428    1429    1434    1435+PN3603
+PN3603     1436    1437    1442    1443    1444    1445    1450    1451+PN3604
+PN3604     1452    1453    1458    1459    1460    1461    1466    1467+PN3605
+PN3605     1468    1469    1470    1471    1472    1473    1478    1479+PN3606
+PN3606     1480    1481    1486    1487    1488    1489    1494    1495+PN3607
+PN3607     1496    1497    1502    1503    1504    1505    1510    1511+PN3608
+PN3608     1512    1513    1518    1519    1520    1521    1526    1527+PN3609
+PN3609     1528    1529    1534    1535    1536    1537    1542    1543+PN3610
+PN3610     1544    1545    1550    1551    1552    1553    1558    1559+PN3611
+PN3611     1560    1561    1566    1567    1568    1569    1574    1575+PN3612
+PN3612     1576    1577    1582    1583    1584    1585    1918    1919+PN3613
+PN3613     1920    1921
$
$ DESVAR for Patch 26
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
DESVAR        26       3       3                                          +DE3601
+DE3601     1397    1396    1394                                          +DE3602
+DE3602     1453    1452    1450                                          +DE3603
+DE3603     1470    1471    1472
PATCH   27       27      127                     1
$
$ PANLST2 for Patch 27
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2       27            1390    1391    1392    1393    1398    1399+PN3701
+PN3701     1400    1401    1406    1407    1408    1409    1414    1415+PN3702
+PN3702     1416    1417    1422    1423    1424    1425    1430    1431+PN3703
+PN3703     1432    1433    1438    1439    1440    1441    1446    1447+PN3704
+PN3704     1448    1449    1454    1455    1456    1457    1462    1463+PN3705
+PN3705     1464    1465    1474    1475    1476    1477    1482    1483+PN3706
+PN3706     1484    1485    1490    1491    1492    1493    1498    1499+PN3707
```

```
+PN3707     1500    1501    1506    1507    1508    1509    1514    1515+PN3708
+PN3708     1516    1517    1522    1523    1524    1525    1530    1531+PN3709
+PN3709     1532    1533    1538    1539    1540    1541    1546    1547+PN3710
+PN3710     1548    1549    1554    1555    1556    1557    1562    1563+PN3711
+PN3711     1564    1565    1570    1571    1572    1573    1578    1579+PN3712
+PN3712     1580    1581    1586    1587    1588    1589    1922    1923+PN3713
+PN3713     1924    1932
$
$ DESVAR for Patch 27
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
DESVAR        27       3       3                                          +DE3701
+DE3701     1393    1392    1390                                          +DE3702
+DE3702     1449    1448    1446                                          +DE3703
+DE3703     1474    1475    1477
$
PATCH   28       28      128                     1
$ PANLST2 for Patch 28
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2       28            1882    1883    1884    1885    1874    1875 CONT
CONT        1876    1877    1866    1867    1868    1869    1858    1859 CONT
CONT        1860    1861
$ DESVAR for Patch 28
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
DESVAR        28       2       4                                          +DE3701
+DE3701     1882    1885                                                  +DE3702
+DE3702     1874    1877                                                  +DE3703
+DE3703     1866    1869                                                  +CONT
+CONT       1858    1861
$
$ HOT PANELS for Patch  2
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2      102              8       6      69      20      18      66 CONT
CONT          32      30      63     413     437     377
$
$ PANLST2 of DESVAR for Patch  4
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2      104             418     416     414     442     440     438+PA1403
+PA1403      382     380     378
$
$ PANLST2 of DESVAR for Patch  5
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2      105             423     421     419     447     445     443+PA1503
+PA1503      387     385     383
$
$ PANLST2 of DESVAR for Patch  6
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2      106            1949    1951     424    1941    1943     448+PA1603
+PA1603      523     515     388
$
$ PANLST2 of DESVAR for Patch  7
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2      107             633     635     636     625     627     628+PA1703
+PA1703      613     615     616
$
$ PANLST2 of DESVAR for Patch  8
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2      108            1195    1198    1201    1180    1184    1187+PA1803
+PA1803     1174    1177    1181
$
$ PANLST2 of DESVAR for Patch  9
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2      109            1910    1914    1917    1894    1898    1901+PA1903
+PA1903     1886    1890    1893
$
$ PANLST2 of DESVAR for Patch 10
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2      110            1290    1291    1292    1293   1017    1018  CONT
CONT        1019    1020    1037    1038    1039    1040    677     678  CONT
CONT         679     680
$
$ PANLST2 of DESVAR for Patch 11
```

```
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2      111            1383    1385    1386    1107    1087    1077+PA2103
+PA2103     1141    1131    1126
$
$ PANLST2 of DESVAR for Patch 12
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2      112            1387    1388    1389    1067    1057    1047+PA2203
+PA2203     1121    1116    1111
$
$ PANLST2 of DESVAR for Patch 13
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2      113            1806    1808    1809    1734    1736    1737+PA2303
+PA2303     1814    1816    1817
$
$ PANLST2 of DESVAR for Patch 14
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2      114            1810    1812    1813    1738    1740    1741+PA2403
+PA2403     1818    1820    1821
$
$ PANLST2 of DESVAR for Patch 15
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2      115             55      57      59     195     197     199+PA2503
+PA2503      125     127     129
$
$ PANLST2 of DESVAR for Patch 16
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2      116             389      52      54     309     192     194+PA2603
+PA2603      316     122     124
$
$ PANLST2 of DESVAR for Patch 17
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2      117             394     392     390     269     285     301+PA2703
+PA2703      276     292     308
$
$ PANLST2 of DESVAR for Patch 18
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2      118             399     397     395     229     245     261+PA2803
+PA2803      236     252     268
$
$ PANLST2 of DESVAR for Patch 19
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2      119             522     514     400     461     477     221+PA2903
+PA2903      468     484     228
$
$ PANLST2 of DESVAR for Patch 20
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2      120             609     611     612     557     573     581+PA3003
+PA3003      564     580     588
$
$ PANLST2 of DESVAR for Patch 21
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2      121             941     938     717    1254    1257     757+PA3103
+PA3103     1205    1208     764
$
$ PANLST2 of DESVAR for Patch 22
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2      122            1591     944     942    1623    1251    1253+PA3203
+PA3203     1679    1202    1204
$
$ PANLST2 of DESVAR for Patch 23
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2      123            1597    1594    1592    1629    1626    1624+PA3303
+PA3303     1685    1683    1680
$
$ PANLST2 of DESVAR for Patch 24
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2      124             834     824     804     827     817     797+PA3403
+PA3403     1347    1346    1344
$
$ PANLST2 of DESVAR for Patch 25
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
```

```
PANLST2      125             794     784     774     787     777     767+PA3503
+PA3503     1343    1342    1341
$
$ PANLST2 of DESVAR for Patch 26
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2      126            1397    1396    1394    1453    1452    1450+PA3603
+PA3603     1470    1471    1472
$
$ PANLST2 of DESVAR for Patch 27
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2      127            1393    1392    1390    1449    1448    1446+PA3703
+PA3703     1474    1475    1477
$
$ PANLST2 of DESVAR for Patch 28
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2      128            1882    1885    1874    1877    1866    1869 CONT
CONT        1858    1861
$ PANLST2 of DESVAR for Patch 29
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2      129            1273    1272    1271    1270     840     850 CONT
CONT         860     870     835     845     855     865     697     698 CONT
CONT         699     700
$ PANLST2 of HOT PANELS for Patch 30 (VERTICAL WING)
$ ...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2      130        10210   10201   10196   10105   10096   10091   CONT
CONT    10015   10006   10001
$
$                 PANEL LIST PART
$TRJLST SETID
TRJLST  1                                                               CONT
CONT    1       1.
$TRAJCT TRAJID
$       TIME    MACH    ALTH    AOA     BETA    FORM    FILE1  FILE1
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
TRAJCT   1        1                                                     CONT
CONT         0.0  26.8004800000.    10.0        TECPLOT CPTEMP1.PLT     CONT
CONT        30.0  26.9004572000.    30.0                                CONT
CONT        70.0  26.9004260000.    30.0                                CONT
CONT       110.0  26.9003948000.    30.0                                CONT
CONT       150.0  26.9003636000.    30.0                                CONT
CONT       190.0  26.6003336000.    30.0                                CONT
CONT       230.0  25.6002748000.    30.0                                CONT
CONT       270.0  24.9003012000.    30.0                                CONT
CONT       310.0  24.7003108000.    30.0                                CONT
CONT       350.0  25.1003300000.    30.0                                CONT
CONT       390.0  25.4003492000.    30.0                                CONT
CONT       430.0  25.3003648000.    30.0                                CONT
CONT       470.0  25.3003756000.    30.0                                CONT
CONT       510.0  25.2003792000.    30.0                                CONT
CONT       550.0  25.2003768000.    30.0                                CONT
CONT       590.0  25.2003672000.    30.0                                CONT
CONT       630.0  25.2003528000.    30.0                                CONT
CONT       670.0  24.8003324000.    30.0                                CONT
CONT       710.0  23.9003108000.    30.0                                CONT
CONT       750.0  23.1002952000.    30.0                                CONT
CONT       790.0  22.5002940000.    30.0                                CONT
CONT       830.0  22.3003048000.    30.0                                CONT
CONT       870.0  22.4003168000.    30.0                                CONT
CONT       910.0  22.4003240000.    30.0                                CONT
CONT       950.0  22.2003228000.    30.0                                CONT
CONT       990.0  21.7003120000.    30.0        TECPLOT CPTEMP2.PLT     CONT
CONT      1030.0  21.0002964000.    30.0                                CONT
CONT      1070.0  20.1002820000.    30.0                                CONT
CONT      1110.0  19.4002796000.    30.0                                CONT
CONT      1150.0  18.9002868000.    30.0                                CONT
CONT      1190.0  18.6002916000.    30.0                                CONT
CONT      1230.0  18.2002904000.    30.0                                CONT
CONT      1270.0  17.5002808000.    30.0                                CONT
CONT      1310.0  16.5002688000.    30.0                                CONT
CONT      1350.0  15.5002616000.    30.0                                CONT
CONT      1390.0  14.8002628000.    30.0                                CONT
```

```
CONT      1430.0  14.1002640000.    30.0                                CONT
CONT      1470.0  13.3002592000.    30.0                                CONT
CONT      1510.0  12.4002496000.    30.0                                CONT
CONT      1550.0  11.4002400000.    30.0                                CONT
CONT      1590.0  10.3002352000.    30.0        TECPLOT CPTEMP3.PLT     CONT
CONT      1630.0   9.4002316000.    30.0                                CONT
CONT      1670.0   8.4802256000.    30.0                                CONT
CONT      1710.0   7.4902148000.    30.0                                CONT
CONT      1750.0   6.4402040000.    30.0                                CONT
CONT      1790.0   5.4701932000.    30.0                                CONT
CONT      1830.0   4.5501824000.    30.0                                CONT
CONT      1870.0   3.7101716000.    30.0                                CONT
CONT      1910.0   2.8901572000.    30.0                                CONT
CONT      1950.0   2.1401428000.    30.0
$CONT      1990.0   1.5001284000.    30.0                                 CONT
$CONT      2030.0   1.060  91000.    30.0                                 CONT
$CONT      2070.0   0.881  68100.    30.0                                 CONT
$CONT      2110.0   0.703  48900.    30.0                                 CONT
$CONT      2150.0   0.493  38900.    30.0                                 CONT
$CONT      2190.0   0.404  29900.    30.0                                 CONT
$CONT      2230.0   0.339  21800.    30.0                                 CONT
$CONT      2270.0   0.292  14700.    30.0                                 CONT
$CONT      2310.0   0.257   8230.    30.0                                 CONT
$CONT      2350.0   0.230   2330.    30.0                                 CONT
$CONT      2370.0   0.221      0.    30.0        TECPLOT CPTEMP4.PLT
$
TIMESP         1     0.0   190.0   310.0   470.0   630.0   790.0   950. CONT
CONT      1110.0  1270.0  1430.0  1590.0  1750.0  1950.0
$THERMPR|SETID  |TEMP   |HOTWALL|TRANS  |GAS    |EMMS   |       |       |
THERMPR 1        100F
ENDDATA
```

Listing 5.2 Control Table File: CFDTABLE.DAT

```
Micro-x model consists of body, wing and vertical wing
MICROXGEO.DAT
        REFC        REFB        REFS        REFX        REFY        REFZ  NO AESURFZ LENGTH UNIT   MASS UNIT
  2.2000E+00  1.0000E+00  3.8000E+00  2.6000E+01  0.0000E+00  0.0000E+00           0          IN         LBF/
        MACH           H       ALPHA        BETA       PRATE       QRATE       RRATE          CD          CY          CL          CR          CM          CN        FILE
  2.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  7.9987E+02  2.4940E-02 -1.8397E+01 -1.0540E+00  2.6271E+04  5.9185E+00FLOW0001
  5.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  7.0135E+02 -1.0868E-02  1.3357E+02 -4.1108E-01 -1.7130E+03 -1.6889E+00FLOW0002
  8.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  6.7330E+02 -1.8019E-02  1.2049E+02  5.9189E-01 -1.9725E+03 -1.3009E+00FLOW0003
  1.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  6.6795E+02 -9.2218E-03  1.1453E+02  1.4663E-01 -1.6545E+03  2.5563E+00FLOW0004
  1.2000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  6.6520E+02 -1.1292E-02  1.1113E+02 -4.1814E-02 -1.4654E+03  1.1444E+00FLOW0005
  1.3000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  6.6430E+02 -1.6831E-02  1.1003E+02 -6.2272E-01 -1.4239E+03 -1.3820E+00FLOW0006
  1.4000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  6.6354E+02 -1.3034E-02  1.0916E+02 -9.4352E-02 -1.3887E+03  6.4319E+00FLOW0007
  1.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  6.6306E+02 -4.3498E-03  1.0844E+02  5.1646E-02 -1.3535E+03 -1.6757E+00FLOW0008
  1.6000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  6.6282E+02 -6.1532E-03  1.0779E+02 -6.8531E-01 -1.3243E+03  8.8840E+00FLOW0009
  1.7000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  6.6235E+02 -2.3464E-02  1.0726E+02 -6.8298E-01 -1.3045E+03  8.9478E-01FLOW0010
  1.8000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  6.6197E+02 -1.8758E-02  1.0681E+02 -2.6989E-01 -1.2883E+03 -3.2834E+00FLOW0011
  1.9000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  6.6159E+02 -1.4584E-02  1.0644E+02 -8.2392E-02 -1.2760E+03 -3.5558E+00FLOW0012
  2.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  6.6099E+02 -1.6163E-02  1.0610E+02 -9.5029E-01 -1.2613E+03 -3.3039E+00FLOW0013
  2.1000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  6.6060E+02 -9.5137E-03  1.0581E+02 -9.0870E-01 -1.2525E+03  7.5001E+00FLOW0014
  2.2000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  6.6037E+02 -1.1439E-02  1.0553E+02 -1.0797E+00 -1.2429E+03  4.8779E+00FLOW0015
  2.3000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  6.6001E+02 -1.7055E-02  1.0530E+02 -1.1169E+00 -1.2339E+03  8.2430E+00FLOW0016
  2.4000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  6.5934E+02  1.4383E-03  1.0511E+02 -7.8896E-01 -1.2241E+03  1.3088E+01FLOW0017
  2.5000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  6.5951E+02 -8.7321E-03  1.0491E+02  1.2757E-01 -1.2252E+03 -1.4377E+01FLOW0018
  2.6000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  6.5907E+02  6.9294E-03  1.0479E+02 -6.2751E-01 -1.2162E+03  9.4547E+00FLOW0019
  2.7000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  6.5909E+02 -2.2828E-03  1.0465E+02 -4.6464E-01 -1.2138E+03  7.5297E+00FLOW0020
  2.0000E+00  0.0000E+00  1.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.1302E+03 -5.3110E-02  1.8840E+03  2.6184E+00 -1.7694E+05  2.4126E+01FLOW0021
  5.0000E+00  0.0000E+00  1.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  9.8955E+02  1.0233E-03  1.1771E+03 -1.3776E+00 -1.0334E+05 -3.2820E+00FLOW0022
  8.0000E+00  0.0000E+00  1.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  9.3275E+02 -2.7573E-02  9.3087E+02  1.7026E+00 -7.6650E+04  1.4705E+01FLOW0023
  1.0000E+01  0.0000E+00  1.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  9.1579E+02 -1.8801E-02  8.6497E+02 -2.1790E+00 -6.9495E+04 -8.3944E+00FLOW0024
  1.2000E+01  0.0000E+00  1.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  9.0716E+02 -3.0075E-02  8.2660E+02  6.5880E-01 -6.5357E+04  7.6306E+00FLOW0025
  1.3000E+01  0.0000E+00  1.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  9.0388E+02 -4.6081E-02  8.1343E+02  1.4123E+00 -6.3929E+04  1.0514E+01FLOW0026
  1.4000E+01  0.0000E+00  1.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  9.0126E+02 -3.4669E-02  8.0285E+02 -3.1132E-01 -6.2790E+04  7.1792E-01FLOW0027
  1.5000E+01  0.0000E+00  1.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  8.9921E+02 -2.0596E-02  7.9411E+02 -2.4779E+00 -6.1850E+04 -8.2591E+00FLOW0028
  1.6000E+01  0.0000E+00  1.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  8.9753E+02 -3.8426E-02  7.8695E+02 -3.2025E+00 -6.1077E+04 -1.1007E+01FLOW0029
  1.7000E+01  0.0000E+00  1.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  8.9606E+02 -5.0142E-02  7.8099E+02 -8.2283E-01 -6.0428E+04 -5.6778E-01FLOW0030
  1.8000E+01  0.0000E+00  1.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  8.9492E+02 -4.1506E-02  7.7594E+02 -3.0758E-01 -5.9886E+04  3.6475E+00FLOW0031
  1.9000E+01  0.0000E+00  1.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  8.9378E+02 -4.2402E-02  7.7170E+02  1.4419E-01 -5.9417E+04  4.5156E+00FLOW0032
  2.0000E+01  0.0000E+00  1.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  8.9328E+02 -1.4706E-02  7.6795E+02 -1.9454E-01 -5.9029E+04  2.2919E+00FLOW0033
  2.1000E+01  0.0000E+00  1.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  8.9236E+02 -3.8416E-02  7.6483E+02 -8.0568E-01 -5.8686E+04 -3.1053E+00FLOW0034
  2.2000E+01  0.0000E+00  1.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  8.9165E+02  3.5135E-05  7.6207E+02 -1.5491E+00 -5.8389E+04 -7.6918E+00FLOW0035
  2.3000E+01  0.0000E+00  1.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  8.9083E+02 -3.5267E-02  7.5975E+02 -3.0131E+00 -5.8117E+04 -1.2309E+01FLOW0036
  2.4000E+01  0.0000E+00  1.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  8.9034E+02 -3.6381E-02  7.5762E+02 -1.1169E+00 -5.7896E+04 -4.5978E+00FLOW0037
  2.5000E+01  0.0000E+00  1.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  8.9012E+02 -3.0701E-02  7.5565E+02 -7.0691E-01 -5.7690E+04 -9.9133E-01FLOW0038
  2.6000E+01  0.0000E+00  1.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  8.8955E+02 -8.5557E-03  7.5399E+02 -1.3854E-01 -5.7512E+04 -7.0207E-01FLOW0039
  2.7000E+01  0.0000E+00  1.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  8.8909E+02 -4.6470E-02  7.5258E+02  1.1052E+00 -5.7348E+04  9.7538E+00FLOW0040
  2.0000E+00  0.0000E+00  2.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  2.3237E+03 -5.3518E-02  4.0260E+03  9.4471E+00 -4.1912E+05  2.6880E+01FLOW0041
  5.0000E+00  0.0000E+00  2.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.9169E+03 -7.2632E-02  2.5728E+03  1.8532E+01 -2.6326E+05  5.1118E+01FLOW0042
  8.0000E+00  0.0000E+00  2.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.7952E+03 -1.5172E-01  2.2460E+03  2.4724E+01 -2.2584E+05  6.9763E+01FLOW0043
  1.0000E+01  0.0000E+00  2.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.7638E+03 -1.5190E-01  2.1598E+03  2.2984E+01 -2.1580E+05  6.6612E+01FLOW0044
  1.2000E+01  0.0000E+00  2.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.7468E+03 -6.7094E-02  2.1100E+03  2.0345E+01 -2.1010E+05  5.5507E+01FLOW0045
  1.3000E+01  0.0000E+00  2.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.7406E+03 -9.3756E-02  2.0937E+03  1.5848E+01 -2.0817E+05  4.4619E+01FLOW0046
  1.4000E+01  0.0000E+00  2.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.7370E+03 -6.7049E-02  2.0802E+03  2.6660E+01 -2.0666E+05  6.6820E+01FLOW0047
  1.5000E+01  0.0000E+00  2.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.7333E+03 -7.1051E-02  2.0694E+03  2.0563E+01 -2.0540E+05  5.5005E+01FLOW0048
  1.6000E+01  0.0000E+00  2.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.7303E+03 -6.9892E-02  2.0607E+03  1.3451E+01 -2.0438E+05  3.9020E+01FLOW0049
  1.7000E+01  0.0000E+00  2.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.7276E+03 -6.2605E-02  2.0534E+03  1.7465E+01 -2.0351E+05  4.8107E+01FLOW0050
  1.8000E+01  0.0000E+00  2.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.7265E+03 -5.8031E-02  2.0469E+03  2.7297E+01 -2.0280E+05  7.8672E+01FLOW0051
  1.9000E+01  0.0000E+00  2.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.7247E+03 -3.2628E-02  2.0418E+03  1.8489E+01 -2.0221E+05  5.0938E+01FLOW0052
  2.0000E+01  0.0000E+00  2.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.7240E+03 -4.3411E-02  2.0371E+03  1.6811E+01 -2.0172E+05  4.3563E+01FLOW0053
  2.1000E+01  0.0000E+00  2.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.7220E+03 -5.4399E-02  2.0337E+03  2.5187E+01 -2.0129E+05  7.2112E+01FLOW0054
  2.2000E+01  0.0000E+00  2.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.7211E+03 -1.7178E-02  2.0305E+03  1.6912E+01 -2.0091E+05  4.7533E+01FLOW0055
  2.3000E+01  0.0000E+00  2.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.7198E+03 -4.8520E-02  2.0277E+03  1.9717E+01 -2.0058E+05  5.2020E+01FLOW0056
  2.4000E+01  0.0000E+00  2.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.7194E+03 -1.4288E-02  2.0250E+03  1.9532E+01 -2.0029E+05  5.4093E+01FLOW0057
  2.5000E+01  0.0000E+00  2.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.7188E+03 -7.9614E-02  2.0227E+03  2.5834E+01 -2.0003E+05  7.0329E+01FLOW0058
  2.6000E+01  0.0000E+00  2.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.7175E+03 -2.2476E-02  2.0208E+03  2.3507E+01 -1.9978E+05  6.1725E+01FLOW0059
  2.7000E+01  0.0000E+00  2.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  1.7179E+03 -3.9058E-02  2.0186E+03  1.2482E+01 -1.9959E+05  3.8667E+01FLOW0060
  2.0000E+00  0.0000E+00  3.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  4.3270E+03 -4.5826E-02  5.7496E+03  3.8506E+01 -6.6062E+05  6.4239E+01FLOW0061
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5.0000E+00  0.0000E+00  3.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  3.5528E+03  1.6714E-02  3.9715E+03  2.5802E+01 -4.6293E+05  4.4717E+01FLOW0062
8.0000E+00  0.0000E+00  3.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  3.4141E+03 -2.4570E-02  3.6795E+03  6.1014E+01 -4.3003E+05  1.0571E+02FLOW0063
1.0000E+01  0.0000E+00  3.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  3.3798E+03 -1.9887E-03  3.6100E+03  6.4606E+01 -4.2225E+05  1.0649E+02FLOW0064
1.2000E+01  0.0000E+00  3.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  3.3584E+03  2.5231E-02  3.5713E+03  4.8518E+01 -4.1765E+05  7.9896E+01FLOW0065
1.3000E+01  0.0000E+00  3.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  3.3497E+03  6.2068E-02  3.5576E+03  3.7255E+01 -4.1587E+05  6.5100E+01FLOW0066
1.4000E+01  0.0000E+00  3.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  3.3408E+03  5.5995E-02  3.5448E+03  4.4213E+01 -4.1409E+05  7.4399E+01FLOW0067
1.5000E+01  0.0000E+00  3.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  3.3344E+03  2.6728E-02  3.5323E+03  4.0167E+01 -4.1241E+05  6.9410E+01FLOW0068
1.6000E+01  0.0000E+00  3.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  3.3267E+03  3.2710E-02  3.5233E+03  3.4928E+01 -4.1097E+05  5.8694E+01FLOW0069
1.7000E+01  0.0000E+00  3.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  3.3223E+03  1.0074E-01  3.5154E+03  5.6788E+01 -4.0995E+05  9.8485E+01FLOW0070
1.8000E+01  0.0000E+00  3.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  3.3194E+03  5.8266E-02  3.5087E+03  3.4700E+01 -4.0914E+05  5.3266E+01FLOW0071
1.9000E+01  0.0000E+00  3.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  3.3158E+03  3.8586E-02  3.5040E+03  4.5140E+01 -4.0849E+05  7.3626E+01FLOW0072
2.0000E+01  0.0000E+00  3.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  3.3132E+03  5.3006E-02  3.5001E+03  3.4775E+01 -4.0797E+05  5.6040E+01FLOW0073
2.1000E+01  0.0000E+00  3.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  3.3122E+03  4.0929E-02  3.4959E+03  4.1413E+01 -4.0752E+05  7.1934E+01FLOW0074
2.2000E+01  0.0000E+00  3.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  3.3097E+03  1.1559E-02  3.4931E+03  3.9542E+01 -4.0710E+05  6.8340E+01FLOW0075
2.3000E+01  0.0000E+00  3.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  3.3079E+03  4.8312E-02  3.4903E+03  5.6794E+01 -4.0670E+05  9.3945E+01FLOW0076
2.4000E+01  0.0000E+00  3.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  3.3068E+03  3.9368E-02  3.4876E+03  4.0710E+01 -4.0640E+05  6.9294E+01FLOW0077
2.5000E+01  0.0000E+00  3.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  3.3063E+03  6.2402E-02  3.4848E+03  4.3829E+01 -4.0614E+05  7.3055E+01FLOW0078
2.6000E+01  0.0000E+00  3.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  3.3041E+03  6.0713E-02  3.4837E+03  3.7603E+01 -4.0586E+05  5.8154E+01FLOW0079
2.7000E+01  0.0000E+00  3.0000E+01  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  3.3033E+03  8.4541E-02  3.4818E+03  5.2618E+01 -4.0565E+05  9.1047E+01FLOW0080
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Listing 5.3 ZONAIR Solution File: FLOWi

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(Only SHOWS a part of the file:FLOW0001)
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 9.619778395E-02 5.436116457E-02 4.991298914E-02 4.770684242E-02 4.299765825E-02
 4.183274508E-02 3.665608168E-02 3.512001038E-02 3.758484125E-02 3.772926331E-02
 9.825031757E-01 6.754822135E-01 7.071994543E-01 9.892979860E-01 9.892979860E-01
 9.913231730E-01 9.913231730E-01 7.071994543E-01 6.754822135E-01 9.765903354E-01
 8.811721802E-01 1.057591319E+00 2.001529932E-01 2.191572785E-01 2.264531851E-01
 2.185388207E-01 3.946537971E-01 4.044893384E-01 4.169285893E-01 4.162319303E-01
 5.695723295E-01 5.387215614E-01 5.536199808E-01 5.355664492E-01 6.703280210E-01
 6.499575377E-01 6.616235375E-01 6.523061395E-01 7.403930426E-01 7.205289602E-01
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 8.743689060E-01 8.761911392E-01 8.513665199E-01 8.575658798E-01 9.023347497E-01
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 8.537606001E-01 8.148640394E-01 7.312706709E-01 6.483232379E-01 5.672322512E-01
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9.260224104E-01 9.531531334E-01 9.410623312E-01 8.715946674E-01 8.519198895E-01
8.498955369E-01 8.582879305E-01 8.727642298E-01 8.891910315E-01 9.511023164E-01
9.517663717E-01 9.509505630E-01 9.390847683E-01 9.128435850E-01 8.850923777E-01
8.711460829E-01 8.683576584E-01 9.511168003E-01 9.509820938E-01 9.508953691E-01
9.515340924E-01 9.522268772E-01 9.508979321E-01 9.405984879E-01 9.193908572E-01
9.536509514E-01 9.532753229E-01 9.527460337E-01 9.525797963E-01 9.523589611E-01
9.524509907E-01 9.528926015E-01 9.530597925E-01 9.539402127E-01 9.536955357E-01
9.531242847E-01 9.528344870E-01 9.525801539E-01 9.523677230E-01 9.521296024E-01
9.517868757E-01 9.552257061E-01 9.551532865E-01 9.549090266E-01 9.547278881E-01
9.544923306E-01 9.542392492E-01 9.539032578E-01 9.534206390E-01 1.010421038E+00
1.015262604E+00 1.016598463E+00 1.017641306E+00 1.017527699E+00 1.016622305E+00
1.016582012E+00 1.013813138E+00 9.932233095E-01 1.009137392E+00 1.005748630E+00
1.014841199E+00 1.012593508E+00 1.015921354E+00 1.015642762E+00 1.013163686E+00
9.863376021E-01 9.966636300E-01 1.000711083E+00 1.007161975E+00 1.009661317E+00
1.013403893E+00 1.015134215E+00 1.014123678E+00 9.773190022E-01 9.886758924E-01
9.933187366E-01 1.001172543E+00 1.004509568E+00 1.010175824E+00 1.012921214E+00
1.015068293E+00 9.711677432E-01 9.855222106E-01 9.872111082E-01 9.982610941E-01
9.986627102E-01 1.001879573E+00 1.007843852E+00 1.010413885E+00 9.684581757E-01
9.797869921E-01 9.843775034E-01 9.921884537E-01 9.956066012E-01 1.001651525E+00
1.004708052E+00 1.005592108E+00 9.636831284E-01 9.753827453E-01 9.800427556E-01
9.841306806E-01 9.910877943E-01 9.940801859E-01 9.995414019E-01 1.001960754E+00
9.588957429E-01 9.735743403E-01 9.765967727E-01 9.809820056E-01 9.882994294E-01
9.913322926E-01 9.965947270E-01 9.988943934E-01 9.557528496E-01 9.689971209E-01
9.743207693E-01 9.830925465E-01 9.867824316E-01 9.900251627E-01 9.955976009E-01
9.980623722E-01 9.479109645E-01 9.627625346E-01 9.689271450E-01 9.744193554E-01
9.838519096E-01 9.878319502E-01 9.946029186E-01 9.976698756E-01 9.527300596E-01
9.602699280E-01 9.669730067E-01 9.783224463E-01 9.831900597E-01 9.911227822E-01
9.946050048E-01 9.978234172E-01 9.512519836E-01 9.591830373E-01 9.724397063E-01
9.779790044E-01 9.829440713E-01 9.908436537E-01 9.942077398E-01 9.973300099E-01
9.510352612E-01 9.587432742E-01 9.714934826E-01 9.767601490E-01 9.814467430E-01
9.887498021E-01 9.917972684E-01 9.946398139E-01 9.478011727E-01 9.548313618E-01
9.661722183E-01 9.707375169E-01 9.747387171E-01 9.781219959E-01 9.833543897E-01
9.855993390E-01 9.545148611E-01 9.661136270E-01 9.705131054E-01 9.741336107E-01
9.771575332E-01 9.817115068E-01 9.827104211E-01 9.847977757E-01 9.632993340E-01
9.677227139E-01 9.716919065E-01 9.753374457E-01 9.818907976E-01 9.847618341E-01
9.871166945E-01 9.897794127E-01 1.005447745E+00 1.007267833E+00 1.008570433E+00
1.008573890E+00 1.007089734E+00 1.005214334E+00 1.002960801E+00 1.003262997E+00
1.008807898E+00 1.009069920E+00 1.009649873E+00 1.010323524E+00 1.009912848E+00
1.009276390E+00 1.008605361E+00 1.004135489E+00 1.012917757E+00 1.012503743E+00
1.012285590E+00 1.010968566E+00 1.011114001E+00 1.011071563E+00 1.010847330E+00
1.058315873E+00 1.019522429E+00 1.019108772E+00 1.019749761E+00 1.018193841E+00
1.018383861E+00 1.018690705E+00 1.018109322E+00 1.045373321E+00 1.019199252E+00
1.019855261E+00 1.019537210E+00 1.019023538E+00 1.018458009E+00 1.018172383E+00
1.018618464E+00 1.016155362E+00 1.001734138E+00 9.965904951E-01 9.962066412E-01
9.975734353E-01 1.000180244E+00 1.002205014E+00 1.002673388E+00 9.998856783E-01
1.000120759E+00 9.959940910E-01 9.942358732E-01 9.946061373E-01 9.968177080E-01
9.963892698E-01 9.987709522E-01 9.998059869E-01 9.994566441E-01 9.988314171E-01
9.930342436E-01 9.914932251E-01 9.921708703E-01 9.939869046E-01 9.954401255E-01
9.994204044E-01 1.000447512E+00 9.985973835E-01 9.942225218E-01 9.915949702E-01
9.904123545E-01 9.902310967E-01 9.916859269E-01 9.962977171E-01 1.010408282E+00
1.008325934E+00 1.003032327E+00 9.992443919E-01 9.957760572E-01 9.913356900E-01
9.861409664E-01 9.743839502E-01 1.033594489E+00 1.030242920E+00 1.023961663E+00
1.018420696E+00 1.012780070E+00 1.006267309E+00 9.990444183E-01 9.908322096E-01
1.054497600E+00 1.047814012E+00 1.046084523E+00 1.040315986E+00 1.033833623E+00
1.026265264E+00 1.017892241E+00 1.005015016E+00 1.050654054E+00 1.054751635E+00
1.051947713E+00 1.048288941E+00 1.045998573E+00 1.042581916E+00 1.032233715E+00

1.025180101E+00 9.900228977E-01 9.905315042E-01 9.909904003E-01 9.910537004E-01
9.911105037E-01 9.910841584E-01 9.900228977E-01 9.905315042E-01 9.909904003E-01
9.910537004E-01 9.911105037E-01 9.910841584E-01 9.621086121E-01 9.547176957E-01
9.529698491E-01 9.529951811E-01 9.677066803E-01 9.642311335E-01 9.657726288E-01
9.656545520E-01 9.733516574E-01 9.746221900E-01 9.753733873E-01 9.729104638E-01
9.757050872E-01 9.781599641E-01 9.802461267E-01 9.820924997E-01 8.939133286E-01
9.338871837E-01 9.470753074E-01 9.626667500E-01 9.759947062E-01 9.957512617E-01
1.004343987E+00 1.020272374E+00 1.025063872E+00 1.030619621E+00 1.034663200E+00
1.037121654E+00 1.038638592E+00 1.039679766E+00 1.040550113E+00 8.865965605E-01
9.387108088E-01 9.526506066E-01 9.654336572E-01 9.793950319E-01 9.956505299E-01
1.006496191E+00 1.019605517E+00 1.024944544E+00 1.029599190E+00 1.032925010E+00
1.034850001E+00 1.036020994E+00 1.036863804E+00 1.037609220E+00 8.925445080E-01
9.488989115E-01 9.570653439E-01 9.693323970E-01 9.837755561E-01 9.982656240E-01
1.010647058E+00 1.019605517E+00 1.027107000E+00 1.030871987E+00 1.033406615E+00
1.034619451E+00 1.035131812E+00 1.035367489E+00 1.035523415E+00 9.043428898E-01
9.567778707E-01 9.645742774E-01 9.734985828E-01 9.909817576E-01 1.002720356E+00
1.017070532E+00 1.022599459E+00 1.031764984E+00 1.034765363E+00 1.036574960E+00
1.037088990E+00 1.036877394E+00 1.036333680E+00 1.035557032E+00 9.156116247E-01
9.552410245E-01 9.738866091E-01 9.810441136E-01 9.996590614E-01 1.009549618E+00
1.024725676E+00 1.027940989E+00 1.038041353E+00 1.040513873E+00 1.041810751E+00
1.041821241E+00 1.041047215E+00 1.039817095E+00 1.037885189E+00 9.250282645E-01
9.644158483E-01 9.830436707E-01 9.901049137E-01 1.007971406E+00 1.017132759E+00
1.032036781E+00 1.037434101E+00 1.044556737E+00 1.046802163E+00 1.047900319E+00
1.047727466E+00 1.046688795E+00 1.045008063E+00 1.045624733E+00 9.337037206E-01
9.728511572E-01 9.916085601E-01 9.985174537E-01 1.015319943E+00 1.023983955E+00
1.038378835E+00 1.043642759E+00 1.050643563E+00 1.052893400E+00 1.054051280E+00
1.053984761E+00 1.052990675E+00 1.051144838E+00 1.051241517E+00 9.412385225E-01
9.802306890E-01 9.914758801E-01 1.005961418E+00 1.013412952E+00 1.029740810E+00
1.043737531E+00 1.049022079E+00 1.056221366E+00 1.058631420E+00 1.060009003E+00
1.060225010E+00 1.059507012E+00 1.057766080E+00 1.057571173E+00 9.468733668E-01
9.858049750E-01 9.971848130E-01 1.011952043E+00 1.019089937E+00 1.034427762E+00
1.048128366E+00 1.053541183E+00 1.061200738E+00 1.063900113E+00 1.065612435E+00
1.066208243E+00 1.065896034E+00 1.064447284E+00 1.064155698E+00 9.506205320E-01
9.894208908E-01 1.000998378E+00 1.016542315E+00 1.023668051E+00 1.038393259E+00
1.045374513E+00 1.057332754E+00 1.065499902E+00 1.068545818E+00 1.070651412E+00
1.071658015E+00 1.071750879E+00 1.070607781E+00 1.070239782E+00 9.531196952E-01
9.918963313E-01 1.003744483E+00 1.020401835E+00 1.027748823E+00 1.042165637E+00
1.048903227E+00 1.060709834E+00 1.069129705E+00 1.072420835E+00 1.074813128E+00
1.076100588E+00 1.076398492E+00 1.075315714E+00 1.074624062E+00 8.850626349E-01
9.945017695E-01 1.006414294E+00 1.015884042E+00 1.031584024E+00 1.045831323E+00
1.052308679E+00 1.063677788E+00 1.071814775E+00 1.074994326E+00 1.077265501E+00
1.078381419E+00 1.078401446E+00 1.076871753E+00 1.075399041E+00 8.904650211E-01
9.819126129E-01 1.008878589E+00 1.018564105E+00 1.034707308E+00 1.048711419E+00
1.054838181E+00 1.065202355E+00 1.069028854E+00 1.074554205E+00 1.076092362E+00
1.076417208E+00 1.075581908E+00 1.073109031E+00 1.070754170E+00 8.930106759E-01
9.838773608E-01 1.009599924E+00 1.019168615E+00 1.035101175E+00 1.048453569E+00
1.054068446E+00 1.063022971E+00 1.068216205E+00 1.069613576E+00 1.070097446E+00
1.069476485E+00 1.067933202E+00 1.065230370E+00 1.063017726E+00 9.981904030E-01
1.019168615E+00 1.027511120E+00 1.042101502E+00 1.048453569E+00 1.058945775E+00
1.066079855E+00 1.068216205E+00 1.069613576E+00 1.070097446E+00 1.069476485E+00
1.067933202E+00 1.058326840E+00

Listing 5.4 Standard Output File: MICRO_X_TPS.OUT

E X E C U T I V E C O N T R O L S U M M A R Y

```
|...1...|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|..10...|

ASSIGN AEROBASE='CTRTABLE.DAT',PRINT=0
CEND
```

C A S E C O N T R O L S U M M A R Y

S I N G L E P R E C I S I O N C O M P U T A T I O N

M A X I M U M A L L O C A B L E M E M O R Y = 800 M E G A B Y T E S

```
|...1...|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|..10...|

ECHO = SORT
SUBCASE = 1
SUBTITLE=TPS OPTIMISATION FOR MICRO-X
LABEL= HYPERSONIC AERODYNAMIC ANALYSIS
TPSDES=1
BEGIN BULK
```

S O R T E D B U L K D A T A E C H O

```
CARD
COUNT       |...1...|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|..10...|

    1 -     DESVAR  1       2       3
    2 -             130     201
```

```
  3 -              90      209
  4 -              4       220
  5 -       DESVAR  2       3       4                                       CONT
  6 -       CONT    8       6       69                                      CONT
  7 -       CONT    20      18      66                                      CONT
  8 -       CONT    32      30      63                                      CONT
  9 -       CONT    413     437     377
 10 -       DESVAR  4       3       3                                       +DE1401
 11 -       +DE1401 418     416     414                                     +DE1402
 12 -       +DE1402 442     440     438                                     +DE1403
 13 -       +DE1403 382     380     378
 14 -       DESVAR  5       3       3                                       +DE1501
 15 -       +DE1501 423     421     419                                     +DE1502
 16 -       +DE1502 447     445     443                                     +DE1503
 17 -       +DE1503 387     385     383
 18 -       DESVAR  6       3       3                                       +DE1601
 19 -       +DE1601 1949    1951    424                                     +DE1602
 20 -       +DE1602 1941    1943    448                                     +DE1603
 21 -       +DE1603 523     515     388
 22 -       DESVAR  7       3       3                                       +DE1701
 23 -       +DE1701 633     635     636                                     +DE1702
 24 -       +DE1702 625     627     628                                     +DE1703
 25 -       +DE1703 613     615     616
 26 -       DESVAR  8       3       3                                       +DE1801
 27 -       +DE1801 1195    1198    1201                                    +DE1802
 28 -       +DE1802 1181    1184    1187                                    +DE1803
 29 -       +DE1803 1174    1177    1180
 30 -       DESVAR  9       3       3                                       +DE1901
 31 -       +DE1901 1910    1914    1917                                    +DE1902
 32 -       +DE1902 1894    1898    1901                                    +DE1903
 33 -       +DE1903 1886    1890    1893
 34 -       DESVAR  10      4       4                                       +DE2001
 35 -       +DE2001 1290    1291    1292    1293                            +DE2002
 36 -       +DE2002 1017    1018    1019    1020                            +DE2003
 37 -       +DE2003 1037    1038    1039    1040                            +DE2004
 38 -       +DE2004 677     678     679     680
 39 -       DESVAR  11      3       3                                       +DE2101
 40 -       +DE2101 1383    1385    1386                                    +DE2102
 41 -       +DE2102 1107    1087    1077                                    +DE2103
 42 -       +DE2103 1141    1131    1126
 43 -       DESVAR  12      3       3                                       +DE2201
 44 -       +DE2201 1387    1388    1389                                    +DE2202
 45 -       +DE2202 1067    1057    1047                                    +DE2203
 46 -       +DE2203 1121    1116    1111
 47 -       DESVAR  13      3       3                                       +DE2301
 48 -       +DE2301 1806    1808    1809                                    +DE2302
 49 -       +DE2302 1734    1736    1737                                    +DE2303
 50 -       +DE2303 1814    1816    1817
 51 -       DESVAR  14      3       3                                       +DE2401
 52 -       +DE2401 1810    1812    1813                                    +DE2402
 53 -       +DE2402 1738    1740    1741                                    +DE2403
 54 -       +DE2403 1818    1820    1821
 55 -       DESVAR  15      3       3                                       +DE2501
 56 -       +DE2501 55      57      59                                      +DE2502
 57 -       +DE2502 195     197     199                                     +DE2503
 58 -       +DE2503 125     127     129
 59 -       DESVAR  16      3       3                                       +DE2601
 60 -       +DE2601 389     52      54                                      +DE2602
 61 -       +DE2602 309     192     194                                     +DE2603
 62 -       +DE2603 316     122     124
 63 -       DESVAR  17      3       3                                       +DE2701
 64 -       +DE2701 394     392     390                                     +DE2702
 65 -       +DE2702 269     285     301                                     +DE2703
 66 -       +DE2703 276     292     308
 67 -       DESVAR  18      3       3                                       +DE2801
 68 -       +DE2801 399     397     395                                     +DE2802
 69 -       +DE2802 229     245     261                                     +DE2803
 70 -       +DE2803 236     252     268
 71 -       DESVAR  19      3       3                                       +DE2901
 72 -       +DE2901 522     514     400                                     +DE2902
 73 -       +DE2902 461     477     221                                     +DE2903
 74 -       +DE2903 468     484     228
 75 -       DESVAR  20      3       3                                       +DE3001
 76 -       +DE3001 609     611     612                                     +DE3002
 77 -       +DE3002 557     573     581                                     +DE3003
 78 -       +DE3003 564     580     588
 79 -       DESVAR  21      3       3                                       +DE3101
 80 -       +DE3101 941     938     717                                     +DE3102
 81 -       +DE3102 1254    1257    757                                     +DE3103
 82 -       +DE3103 1205    1208    764
 83 -       DESVAR  22      3       3                                       +DE3201
 84 -       +DE3201 1591    944     942                                     +DE3202
 85 -       +DE3202 1623    1251    1253                                    +DE3203
 86 -       +DE3203 1679    1202    1204
 87 -       DESVAR  23      3       3                                       +DE3301
 88 -       +DE3301 1597    1594    1592                                    +DE3302
 89 -       +DE3302 1629    1626    1624                                    +DE3303
 90 -       +DE3303 1685    1683    1680
 91 -       DESVAR  24      3       3                                       +DE3401
 92 -       +DE3401 834     824     804                                     +DE3402
 93 -       +DE3402 827     817     797                                     +DE3403
 94 -       +DE3403 1347    1346    1344
 95 -       DESVAR  25      3       3                                       +DE3501
 96 -       +DE3501 794     784     774                                     +DE3502
 97 -       +DE3502 787     777     767                                     +DE3503
```

```
 98 -       +DE3503 1343    1342    1341
 99 -       DESVAR  26      3       3                                               +DE3601
100 -       +DE3601 1397    1396    1394                                            +DE3602
101 -       +DE3602 1453    1452    1450                                            +DE3603
102 -       +DE3603 1470    1471    1472
103 -       DESVAR  27      3       3                                               +DE3701
104 -       +DE3701 1393    1392    1390                                            +DE3702
105 -       +DE3702 1449    1448    1446                                            +DE3703
106 -       +DE3703 1474    1475    1477
107 -       DESVAR  28      2       4                                               +DE3701
108 -       +DE3701 1882    1885                                                    +DE3702
109 -       +DE3702 1874    1877                                                    +DE3703
110 -       +DE3703 1866    1869                                                    +CONT
111 -       +CONT   1858    1861
112 -       DESVAR  29      4       4                                               +DE2001
113 -       +DE2001 1273    1272    1271    1270                                    +DE2002
114 -       +DE2002 840     850     860     870                                     +DE2003
115 -       +DE2003 835     845     855     865                                     +DE2004
116 -       +DE2004 697     698     699     700
117 -       DESVAR  30      3       3                                               +DE2001
118 -       +DE2001 10210   10201   10196                                           +DE2002
119 -       +DE2002 10105   10096   10091                                           +DE2003
120 -       +DE2003 10015   10006   10001
121 -       PANLST2 1               1       2       3       4       50      60      +PN1101
122 -       +PN1101 70      80      90      100     110     120     130     140     +PN1102
123 -       +PN1102 150     160     170     180     190     200     201     202     +PN1103
124 -       +PN1103 203     204     205     206     207     208     209     210     +PN1104
125 -       +PN1104 211     212     213     214     215     216     217     218     +PN1105
126 -       +PN1105 219     220
127 -       PANLST2 2               5       6       7       8       9       10      +PN1201
128 -       +PN1201 11      12      13      14      15      16      17      18      +PN1202
129 -       +PN1202 19      20      21      22      23      24      65      66      +PN1203
130 -       +PN1203 67      68      69      75      76      77      78      79      CONT
131 -       CONT    25      26      27      28      29      30      31      32      CONT
132 -       CONT    33      34      35      36      37      38      39      40      CONT
133 -       CONT    61      62      63      64      71      72      73      74      CONT
134 -       CONT    365     377     413     425     437     449
135 -       PANLST2 4               366     367     368     369     370     378     +PN1401
136 -       +PN1401 379     380     381     382     414     415     416     417     +PN1402
137 -       +PN1402 418     426     427     428     429     430     438     439     +PN1403
138 -       +PN1403 440     441     442     450     451     452     453     454
139 -       PANLST2 5               371     372     373     374     375     383     +PN1501
140 -       +PN1501 384     385     386     387     419     420     421     422     +PN1502
141 -       +PN1502 423     431     432     433     434     435     443     444     +PN1503
142 -       +PN1503 445     446     447     455     456     457     458     459
143 -       PANLST2 6               376     388     424     436     448     460     +PN1601
144 -       +PN1601 511     512     515     516     519     520     523     524     +PN1602
145 -       +PN1602 1937    1938    1939    1940    1941    1942    1943    1944    +PN1603
146 -       +PN1603 1945    1946    1947    1948    1949    1950    1951    1952
147 -       PANLST2 7               613     614     615     616     617     618     +PN1701
148 -       +PN1701 619     620     621     622     623     624     625     626     +PN1702
149 -       +PN1702 627     628     629     630     631     632     633     634     +PN1703
150 -       +PN1703 635     636     1936
151 -       PANLST2 8               1174    1175    1176    1177    1178    1179    +PN1801
152 -       +PN1801 1180    1181    1182    1183    1184    1185    1186    1187    +PN1802
153 -       +PN1802 1188    1189    1190    1191    1192    1193    1194    1195    +PN1803
154 -       +PN1803 1196    1197    1198    1199    1200    1201
155 -       PANLST2 9               1886    1887    1888    1889    1890    1891    +PN1901
156 -       +PN1901 1892    1893    1894    1895    1896    1897    1898    1899    +PN1902
157 -       +PN1902 1900    1901    1902    1903    1904    1905    1906    1907    +PN1903
158 -       +PN1903 1908    1909    1910    1911    1912    1913    1914    1915    +PN1904
159 -       +PN1904 1916    1917
160 -       PANLST2 10              661     662     663     664     665     666     +CON
161 -       +CON    667     668     669     670     671     672     673     674     +CON
162 -       +CON    675     676     677     678     679     680     1001    1002    +CON
163 -       +CON    1003    1004    1005    1006    1007    1008    1009    1010    +CON
164 -       +CON    1011    1012    1013    1014    1015    1016    1017    1018    +CON
165 -       +CON    1019    1020    1021    1022    1023    1024    1025    1026    +CON
166 -       +CON    1027    1028    1029    1030    1031    1032    1033    1034    +CON
167 -       +CON    1035    1036    1037    1038    1039    1040    1290    1291    +CON
168 -       +CON    1292    1293    1294    1295    1296    1297    1298    1299    +CON
169 -       +CON    1300    1301    1302    1303    1304    1305
170 -       PANLST2 11              1071    1072    1073    1074    1075    1076    +PN2101
171 -       +PN2101 1077    1078    1079    1080    1081    1082    1083    1084    +PN2102
172 -       +PN2102 1085    1086    1087    1088    1089    1090    1091    1092    +PN2103
173 -       +PN2103 1093    1094    1095    1096    1097    1098    1099    1100    +PN2104
174 -       +PN2104 1101    1102    1103    1104    1105    1106    1107    1108    +PN2105
175 -       +PN2105 1109    1110    1126    1127    1128    1129    1130    1131    +PN2106
176 -       +PN2106 1132    1133    1134    1135    1136    1137    1138    1139    +PN2107
177 -       +PN2107 1140    1141    1142    1143    1144    1145    1158    1159    +PN2108
178 -       +PN2108 1160    1161    1162    1163    1164    1165    1166    1167    +PN2109
179 -       +PN2109 1168    1169    1170    1171    1172    1173    1348    1349    +PN2110
180 -       +PN2110 1350    1351    1355    1356    1357    1358    1362    1363    +PN2111
181 -       +PN2111 1364    1365    1369    1370    1371    1372    1376    1377    +PN2112
182 -       +PN2112 1378    1379    1383    1384    1385    1386
183 -       PANLST2 12              1041    1042    1043    1044    1045    1046    +PN2201
184 -       +PN2201 1047    1048    1049    1050    1051    1052    1053    1054    +PN2202
185 -       +PN2202 1055    1056    1057    1058    1059    1060    1061    1062    +PN2203
186 -       +PN2203 1063    1064    1065    1066    1067    1068    1069    1070    +PN2204
187 -       +PN2204 1111    1112    1113    1114    1115    1116    1117    1118    +PN2205
188 -       +PN2205 1119    1120    1121    1122    1123    1124    1125    1146    +PN2206
189 -       +PN2206 1147    1148    1149    1150    1151    1152    1153    1154    +PN2207
190 -       +PN2207 1155    1156    1157    1352    1353    1354    1359    1360    +PN2208
191 -       +PN2208 1361    1366    1367    1368    1373    1374    1375    1380    +PN2209
192 -       +PN2209 1381    1382    1387    1388    1389
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193 -       PANLST2 13              1686    1687    1688    1689    1694    1695    +CON
194 -       +CON    1696    1697    1702    1703    1704    1705    1710    1711    +CON
195 -       +CON    1712    1713    1718    1719    1720    1721    1726    1727    +CON
196 -       +CON    1728    1729    1734    1735    1736    1737    1742    1743    +CON
197 -       +CON    1744    1745    1750    1751    1752    1753    1758    1759    +CON
198 -       +CON    1760    1761    1766    1767    1768    1769    1774    1775    +CON
199 -       +CON    1776    1777    1782    1783    1784    1785    1790    1791    +CON
200 -       +CON    1792    1793    1798    1799    1800    1801    1806    1807    +CON
201 -       +CON    1808    1809    1814    1815    1816    1817    1822    1823    +CON
202 -       +CON    1824    1825    1830    1831    1832    1833    1838    1839    +CON
203 -       +CON    1840    1841    1846    1847    1848    1849
204 -       PANLST2 14              1690    1691    1692    1693    1698    1699    +PN2401
205 -       +PN2401 1700    1701    1706    1707    1708    1709    1714    1715    +PN2402
206 -       +PN2402 1716    1717    1722    1723    1724    1725    1730    1731    +PN2403
207 -       +PN2403 1732    1733    1738    1739    1740    1741    1746    1747    +PN2404
208 -       +PN2404 1748    1749    1754    1755    1756    1757    1762    1763    +PN2405
209 -       +PN2405 1764    1765    1770    1771    1772    1773    1778    1779    +PN2406
210 -       +PN2406 1780    1781    1786    1787    1788    1789    1794    1795    +PN2407
211 -       +PN2407 1796    1797    1802    1803    1804    1805    1810    1811    +PN2408
212 -       +PN2408 1812    1813    1818    1819    1820    1821    1826    1827    +PN2409
213 -       +PN2409 1828    1829    1834    1835    1836    1837    1842    1843    +PN2410
214 -       +PN2410 1844    1845    1850    1851    1852    1853    1854    1855    +PN2411
215 -       +PN2411 1856    1857    1862    1863    1864    1865    1870    1871    +PN2412
216 -       +PN2412 1872    1873    1878    1879    1880    1881    1929    1930    +PN2413
217 -       +PN2413 1931    1933
218 -       PANLST2 15              45      46      47      48      49      55      +PN2501
219 -       +PN2501 56      57      58      59      85      86      87      88      +PN2502
220 -       +PN2502 89      95      96      97      98      99      105     106     +PN2503
221 -       +PN2503 107     108     109     115     116     117     118     119     +PN2504
222 -       +PN2504 125     126     127     128     129     135     136     137     +PN2505
223 -       +PN2505 138     139     145     146     147     148     149     155     +PN2506
224 -       +PN2506 156     157     158     159     165     166     167     168     +PN2507
225 -       +PN2507 169     175     176     177     178     179     185     186     +PN2508
226 -       +PN2508 187     188     189     195     196     197     198     199
227 -       PANLST2 16              41      42      43      44      51      52      +PN2601
228 -       +PN2601 53      54      81      82      83      84      91      92      +PN2602
229 -       +PN2602 93      94      101     102     103     104     111     112     +PN2603
230 -       +PN2603 113     114     121     122     123     124     131     132     +PN2604
231 -       +PN2604 133     134     141     142     143     144     151     152     +PN2605
232 -       +PN2605 153     154     161     162     163     164     171     172     +PN2606
233 -       +PN2606 173     174     181     182     183     184     191     192     +PN2607
234 -       +PN2607 193     194     309     310     311     312     313     314     +PN2608
235 -       +PN2608 315     316     317     329     341     353     389     401
236 -       PANLST2 17              269     270     271     272     273     274     +PN2701
237 -       +PN2701 275     276     277     278     279     280     281     282     +PN2702
238 -       +PN2702 283     284     285     286     287     288     289     290     +PN2703
239 -       +PN2703 291     292     293     294     295     296     297     298     +PN2704
240 -       +PN2704 299     300     301     302     303     304     305     306     +PN2705
241 -       +PN2705 307     308     318     319     320     321     322     330     +PN2706
242 -       +PN2706 331     332     333     334     342     343     344     345     +PN2707
243 -       +PN2707 346     354     355     356     357     358     390     391     +PN2708
244 -       +PN2708 392     393     394     402     403     404     405     406
245 -       PANLST2 18              229     230     231     232     233     234     +PN2801
246 -       +PN2801 235     236     237     238     239     240     241     242     +PN2802
247 -       +PN2802 243     244     245     246     247     248     249     250     +PN2803
248 -       +PN2803 251     252     253     254     255     256     257     258     +PN2804
249 -       +PN2804 259     260     261     262     263     264     265     266     +PN2805
250 -       +PN2805 267     268     323     324     325     326     327     335     +PN2806
251 -       +PN2806 336     337     338     339     347     348     349     350     +PN2807
252 -       +PN2807 351     359     360     361     362     363     395     396     +PN2808
253 -       +PN2808 397     398     399     407     408     409     410     411
254 -       PANLST2 19              221     222     223     224     225     226     +PN2901
255 -       +PN2901 227     228     328     340     352     364     400     412     +PN2902
256 -       +PN2902 461     462     463     464     465     466     467     468     +PN2903
257 -       +PN2903 469     470     471     472     473     474     475     476     +PN2904
258 -       +PN2904 477     478     479     480     481     482     483     484     +PN2905
259 -       +PN2905 485     486     487     488     489     490     491     492     +PN2906
260 -       +PN2906 493     494     495     496     497     498     499     500     +PN2907
261 -       +PN2907 501     502     503     504     505     506     507     508     +PN2908
262 -       +PN2908 509     510     513     514     517     518     521     522
263 -       PANLST2 20              557     558     559     560     561     562     +PN3001
264 -       +PN3001 563     564     565     566     567     568     569     570     +PN3002
265 -       +PN3002 571     572     573     574     575     576     577     578     +PN3003
266 -       +PN3003 579     580     581     582     583     584     585     586     +PN3004
267 -       +PN3004 587     588     589     590     591     592     593     594     +PN3005
268 -       +PN3005 595     596     597     598     599     600     601     602     +PN3006
269 -       +PN3006 603     604     605     606     607     608     609     610     +PN3007
270 -       +PN3007 611     612
271 -       PANLST2 21              717     718     719     720     721     722     +PN3101
272 -       +PN3101 723     724     725     726     727     728     729     730     +PN3102
273 -       +PN3102 731     732     733     734     735     736     737     738     +PN3103
274 -       +PN3103 739     740     741     742     743     744     745     746     +PN3104
275 -       +PN3104 747     748     749     750     751     752     753     754     +PN3105
276 -       +PN3105 755     756     757     758     759     760     761     762     +PN3106
277 -       +PN3106 763     764     938     939     940     941     945     946     +PN3107
278 -       +PN3107 947     948     952     953     954     955     959     960     +PN3108
279 -       +PN3108 961     962     1205    1206    1207    1208    1212    1213    +PN3109
280 -       +PN3109 1214    1215    1219    1220    1221    1222    1226    1227    +PN3110
281 -       +PN3110 1228    1229    1233    1234    1235    1236    1240    1241    +PN3111
282 -       +PN3111 1242    1243    1247    1248    1249    1250    1254    1255    +PN3112
283 -       +PN3112 1256    1257
284 -       PANLST2 22              942     943     944     949     950     951     +PN3201
285 -       +PN3201 956     957     958     963     964     965     1202    1203    +PN3202
286 -       +PN3202 1204    1209    1210    1211    1216    1217    1218    1223    +PN3203
287 -       +PN3203 1224    1225    1230    1231    1232    1237    1238    1239    +PN3204
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288 -       +PN3204 1244    1245    1246    1251    1252    1253    1590    1591    +PN3205
289 -       +PN3205 1598    1599    1606    1607    1614    1615    1622    1623    +PN3206
290 -       +PN3206 1630    1631    1638    1639    1646    1647    1654    1655    +PN3207
291 -       +PN3207 1662    1663    1670    1671    1678    1679
292 -       PANLST2 23              1592    1593    1594    1595    1596    1597    +PN3301
293 -       +PN3301 1600    1601    1602    1603    1604    1605    1608    1609    +PN3302
294 -       +PN3302 1610    1611    1612    1613    1616    1617    1618    1619    +PN3303
295 -       +PN3303 1620    1621    1624    1625    1626    1627    1628    1629    +PN3304
296 -       +PN3304 1632    1633    1634    1635    1636    1637    1640    1641    +PN3305
297 -       +PN3305 1642    1643    1644    1645    1648    1649    1650    1651    +PN3306
298 -       +PN3306 1652    1653    1656    1657    1658    1659    1660    1661    +PN3307
299 -       +PN3307 1664    1665    1666    1667    1668    1669    1672    1673    +PN3308
300 -       +PN3308 1674    1675    1676    1677    1680    1681    1682    1683    +PN3309
301 -       +PN3309 1684    1685
302 -       PANLST2 24              795     796     797     798     799     800     +PN3401
303 -       +PN3401 801     802     803     804     805     806     807     808     +PN3402
304 -       +PN3402 809     810     811     812     813     814     815     816     +PN3403
305 -       +PN3403 817     818     819     820     821     822     823     824     +PN3404
306 -       +PN3404 825     826     827     828     829     830     831     832     +PN3405
307 -       +PN3405 833     834     875     876     877     878     882     883     +PN3406
308 -       +PN3406 884     885     889     890     891     892     896     897     +PN3407
309 -       +PN3407 898     899     903     904     905     906     910     911     +PN3408
310 -       +PN3408 912     913     917     918     919     920     924     925     +PN3409
311 -       +PN3409 926     927     931     932     933     934     1309    1310    +PN3410
312 -       +PN3410 1311    1312    1316    1317    1318    1319    1323    1324    +PN3411
313 -       +PN3411 1325    1326    1330    1331    1332    1333    1337    1338    +PN3412
314 -       +PN3412 1339    1340    1344    1345    1346    1347
315 -       PANLST2 25              765     766     767     768     769     770     +PN3501
316 -       +PN3501 771     772     773     774     775     776     777     778     +PN3502
317 -       +PN3502 779     780     781     782     783     784     785     786     +PN3503
318 -       +PN3503 787     788     789     790     791     792     793     794     +PN3504
319 -       +PN3504 879     880     881     886     887     888     893     894     +PN3505
320 -       +PN3505 895     900     901     902     907     908     909     914     +PN3506
321 -       +PN3506 915     916     921     922     923     928     929     930     +PN3507
322 -       +PN3507 935     936     937     1306    1307    1308    1313    1314    +PN3508
323 -       +PN3508 1315    1320    1321    1322    1327    1328    1329    1334    +PN3509
324 -       +PN3509 1335    1336    1341    1342    1343
325 -       PANLST2 26              1394    1395    1396    1397    1402    1403    +PN3601
326 -       +PN3601 1404    1405    1410    1411    1412    1413    1418    1419    +PN3602
327 -       +PN3602 1420    1421    1426    1427    1428    1429    1434    1435    +PN3603
328 -       +PN3603 1436    1437    1442    1443    1444    1445    1450    1451    +PN3604
329 -       +PN3604 1452    1453    1458    1459    1460    1461    1466    1467    +PN3605
330 -       +PN3605 1468    1469    1470    1471    1472    1473    1478    1479    +PN3606
331 -       +PN3606 1480    1481    1486    1487    1488    1489    1494    1495    +PN3607
332 -       +PN3607 1496    1497    1502    1503    1504    1505    1510    1511    +PN3608
333 -       +PN3608 1512    1513    1518    1519    1520    1521    1526    1527    +PN3609
334 -       +PN3609 1528    1529    1534    1535    1536    1537    1542    1543    +PN3610
335 -       +PN3610 1544    1545    1550    1551    1552    1553    1558    1559    +PN3611
336 -       +PN3611 1560    1561    1566    1567    1568    1569    1574    1575    +PN3612
337 -       +PN3612 1576    1577    1582    1583    1584    1585    1918    1919    +PN3613
338 -       +PN3613 1920    1921
339 -       PANLST2 27              1390    1391    1392    1393    1398    1399    +PN3701
340 -       +PN3701 1400    1401    1406    1407    1408    1409    1414    1415    +PN3702
341 -       +PN3702 1416    1417    1422    1423    1424    1425    1430    1431    +PN3703
342 -       +PN3703 1432    1433    1438    1439    1440    1441    1446    1447    +PN3704
343 -       +PN3704 1448    1449    1454    1455    1456    1457    1462    1463    +PN3705
344 -       +PN3705 1464    1465    1474    1475    1476    1477    1482    1483    +PN3706
345 -       +PN3706 1484    1485    1490    1491    1492    1493    1498    1499    +PN3707
346 -       +PN3707 1500    1501    1506    1507    1508    1509    1514    1515    +PN3708
347 -       +PN3708 1516    1517    1522    1523    1524    1525    1530    1531    +PN3709
348 -       +PN3709 1532    1533    1538    1539    1540    1541    1546    1547    +PN3710
349 -       +PN3710 1548    1549    1554    1555    1556    1557    1562    1563    +PN3711
350 -       +PN3711 1564    1565    1570    1571    1572    1573    1578    1579    +PN3712
351 -       +PN3712 1580    1581    1586    1587    1588    1589    1922    1923    +PN3713
352 -       +PN3713 1924    1932
353 -       PANLST2 28              1882    1883    1884    1885    1874    1875    CONT
354 -       CONT    1876    1877    1866    1867    1868    1869    1858    1859    CONT
355 -       CONT    1860    1861
356 -       PANLST2 29              681     682     683     684     685     686     +CON
357 -       +CON    687     688     689     690     691     692     693     694     +CON
358 -       +CON    695     696     697     698     699     700     835     836     +CON
359 -       +CON    837     838     839     840     841     842     843     844     +CON
360 -       +CON    845     846     847     848     849     850     851     852     +CON
361 -       +CON    853     854     855     856     857     858     859     860     +CON
362 -       +CON    861     862     863     864     865     866     867     868     +CON
363 -       +CON    869     870     871     872     873     874     1258    1259    +CON
364 -       +CON    1260    1261    1262    1263    1264    1265    1266    1267    +CON
365 -       +CON    1268    1269    1270    1271    1272    1273
366 -       PANLST2 30              10001   10002   10003   10004   10005   10006   +CON
367 -       +CON    10007   10008   10009   10010   10011   10012   10013   10014   +CON
368 -       +CON    10015   10016   10017   10018   10019   10020   10021   10022   +CON
369 -       +CON    10023   10024   10025   10026   10027   10028   10029   10030   +CON
370 -       +CON    10031   10032   10033   10034   10035   10036   10037   10038   +CON
371 -       +CON    10039   10040   10041   10042   10043   10044   10045   10046   +CON
372 -       +CON    10047   10048   10049   10050   10051   10052   10053   10054   +CON
373 -       +CON    10055   10056   10057   10058   10059   10060   10061   10062   +CON
374 -       +CON    10063   10064   10065   10066   10067   10068   10069   10070   +CON
375 -       +CON    10071   10072   10073   10074   10075   10076   10077   10078   +CON
376 -       +CON    10079   10080   10081   10082   10083   10084   10085   10086   +CON
377 -       +CON    10087   10088   10089   10090   10091   10092   10093   10094   +CON
378 -       +CON    10095   10096   10097   10098   10099   10100   10101   10102   +CON
379 -       +CON    10103   10104   10105   10106   10107   10108   10109   10110   +CON
380 -       +CON    10111   10112   10113   10114   10115   10116   10117   10118   +CON
381 -       +CON    10119   10120   10121   10122   10123   10124   10125   10126   +CON
382 -       +CON    10127   10128   10129   10130   10131   10132   10133   10134   +CON
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383 -       +CON    10135   10136   10137   10138   10139   10140   10141   10142   +CON
384 -       +CON    10143   10144   10145   10146   10147   10148   10149   10150   +CON
385 -       +CON    10151   10152   10153   10154   10155   10156   10157   10158   +CON
386 -       +CON    10159   10160   10161   10162   10163   10164   10165   10166   +CON
387 -       +CON    10167   10168   10169   10170   10171   10172   10173   10174   +CON
388 -       +CON    10175   10176   10177   10178   10179   10180   10181   10182   +CON
389 -       +CON    10183   10184   10185   10186   10187   10188   10189   10190   +CON
390 -       +CON    10191   10192   10193   10194   10195   10196   10197   10198   +CON
391 -       +CON    10199   10200   10201   10202   10203   10204   10205   10206   +CON
392 -       +CON    10207   10208   10209   10210   10421   10422   10423   10424   +CON
393 -       +CON    10425   10426   10427   10428   10429   10430   10431   10432   +CON
394 -       +CON    10433   10434   10435
395 -       PANLST2 101             130     201     90      209     4       220     CONT
396 -       CONT    170
397 -       PANLST2 102             8       6       69      20      18      66      CONT
398 -       CONT    32      30      63      413     437     377
399 -       PANLST2 104             418     416     414     442     440     438     +PA1403
400 -       +PA1403 382     380     378
401 -       PANLST2 105             423     421     419     447     445     443     +PA1503
402 -       +PA1503 387     385     383
403 -       PANLST2 106             1949    1951    424     1941    1943    448     +PA1603
404 -       +PA1603 523     515     388
405 -       PANLST2 107             633     635     636     625     627     628     +PA1703
406 -       +PA1703 613     615     616
407 -       PANLST2 108             1195    1198    1201    1180    1184    1187    +PA1803
408 -       +PA1803 1174    1177    1181
409 -       PANLST2 109             1910    1914    1917    1894    1898    1901    +PA1903
410 -       +PA1903 1886    1890    1893
411 -       PANLST2 110             1290    1291    1292    1293    1017    1018    CONT
412 -       CONT    1019    1020    1037    1038    1039    1040    677     678     CONT
413 -       CONT    679     680
414 -       PANLST2 111             1383    1385    1386    1107    1087    1077    +PA2103
415 -       +PA2103 1141    1131    1126
416 -       PANLST2 112             1387    1388    1389    1067    1057    1047    +PA2203
417 -       +PA2203 1121    1116    1111
418 -       PANLST2 113             1806    1808    1809    1734    1736    1737    +PA2303
419 -       +PA2303 1814    1816    1817
420 -       PANLST2 114             1810    1812    1813    1738    1740    1741    +PA2403
421 -       +PA2403 1818    1820    1821
422 -       PANLST2 115             55      57      59      195     197     199     +PA2503
423 -       +PA2503 125     127     129
424 -       PANLST2 116             389     52      54      309     192     194     +PA2603
425 -       +PA2603 316     122     124
426 -       PANLST2 117             394     392     390     269     285     301     +PA2703
427 -       +PA2703 276     292     308
428 -       PANLST2 118             399     397     395     229     245     261     +PA2803
429 -       +PA2803 236     252     268
430 -       PANLST2 119             522     514     400     461     477     221     +PA2903
431 -       +PA2903 468     484     228
432 -       PANLST2 120             609     611     612     557     573     581     +PA3003
433 -       +PA3003 564     580     588
434 -       PANLST2 121             941     938     717     1254    1257    757     +PA3103
435 -       +PA3103 1205    1208    764
436 -       PANLST2 122             1591    944     942     1623    1251    1253    +PA3203
437 -       +PA3203 1679    1202    1204
438 -       PANLST2 123             1597    1594    1592    1629    1626    1624    +PA3303
439 -       +PA3303 1685    1683    1680
440 -       PANLST2 124             834     824     804     827     817     797     +PA3403
441 -       +PA3403 1347    1346    1344
442 -       PANLST2 125             794     784     774     787     777     767     +PA3503
443 -       +PA3503 1343    1342    1341
444 -       PANLST2 126             1397    1396    1394    1453    1452    1450    +PA3603
445 -       +PA3603 1470    1471    1472
446 -       PANLST2 127             1393    1392    1390    1449    1448    1446    +PA3703
447 -       +PA3703 1474    1475    1477
448 -       PANLST2 128             1882    1885    1874    1877    1866    1869    CONT
449 -       CONT    1858    1861
450 -       PANLST2 129             1273    1272    1271    1270    840     850     CONT
451 -       CONT    860     870     835     845     855     865     697     698     CONT
452 -       CONT    699     700
453 -       PANLST2 130             10210   10201   10196   10105   10096   10091   CONT
454 -       CONT    10015   10006   10001
455 -       PATCH   1       1       101
456 -       PATCH   2       2       102
457 -       PATCH   4       4       104                     1
458 -       PATCH   5       5       105                     1
459 -       PATCH   6       6       106                     1
460 -       PATCH   7       7       107                     1
461 -       PATCH   8       8       108                     1
462 -       PATCH   9       9       109                     1
463 -       PATCH   10      10      110                     1
464 -       PATCH   11      11      111                     1
465 -       PATCH   12      12      112                     1
466 -       PATCH   13      13      113
467 -       PATCH   14      14      114                     1
468 -       PATCH   15      15      115                     1
469 -       PATCH   16      16      116                     1
470 -       PATCH   17      17      117                     1
471 -       PATCH   18      18      118                     1
472 -       PATCH   19      19      119                     1
473 -       PATCH   20      20      120                     1
474 -       PATCH   21      21      121                     1
475 -       PATCH   22      22      122                     1
476 -       PATCH   23      23      123                     1
477 -       PATCH   24      24      124                     1
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478 -       PATCH   25      25      125                     1
479 -       PATCH   26      26      126                     1
480 -       PATCH   27      27      127                     1
481 -       PATCH   28      28      128                     1
482 -       PATCH   29      29      129                     1
483 -       PATCH   30      30      130                     1
484 -       PLTAERO 1       YES     NO              TECPLOT MICRO_X_GEO.PLT
485 -       PLTAERO 1       YES     NO              NASTRAN MICRO_X_GEO.NAS
486 -       PLTTPS  -2      1       ALL     TECPLOT MICRO_X_HT1.PLT -30.
487 -       PLTTPS  1       1       ALL     TECPLOT MICRO_X_HT.PLT  0.05
488 -       PRVAL   4
489 -       PODRSM  1       1                               SAVE    MICRO-X 1.RST   CONT
490 -       CONT    CPPODRSM.P3D    UPODRSM.P3D     VPODRSM .P3D    WPODRSM .P3D
491 -       STTYPE  11      6       256                                             CONT
492 -       CONT    0.03
493 -       STTYPE  12      2       129     129                                     CONT
494 -       CONT    0.03    0.03    0.5
495 -       STTYPE  13      1       225                                             CONT
496 -       CONT    2.0
497 -       STTYPE  14      6       245                                             CONT
498 -       CONT    0.008
499 -       STTYPE  15      1       247                                             CONT
500 -       CONT    0.16
501 -       STTYPE  21      6       221                                             CONT
502 -       CONT    0.05
503 -       STTYPE  22      1       225                                             CONT
504 -       CONT    3.0
505 -       STTYPE  23      6       245                                             CONT
506 -       CONT    0.008
507 -       STTYPE  24      1       247                                             CONT
508 -       CONT    0.16
509 -       STTYPE  42      1       224                                             CONT
510 -       CONT    3.0
511 -       THERMPR 1       100F
512 -       TIMESP  1       0.0     190.0   310.0   470.0   630.0   790.0   950.    CONT
513 -       CONT    1110.0  1270.0  1430.0  1590.0  1750.0  1950.0
514 -       TPSDES  1       1       1       2                                       CONT
515 -       CONT    1       2       30      4       5       6       7       8       CONT
516 -       CONT    9       10      11      12      13      14      15      16      CONT
517 -       CONT    17      18      19      20      21      22      23      24      CONT
518 -       CONT    25      26      27      28      29
519 -       TPSSYM  1       1       5       4                                       CONT
520 -       CONT    1       11      0.01    2.                                      CONT
521 -       CONT    1       12      0.01    1.28333                                 CONT
522 -       CONT    1       13      1.0     10.                                     CONT
523 -       CONT    1       14      0.001   1.28333                                 CONT
524 -       CONT    1       15      0.05    1.28333
525 -       TPSSYM  2       2       4       4                                       CONT
526 -       CONT    2       21      0.01    2.                                      CONT
527 -       CONT    2       22      1.      10.                                     CONT
528 -       CONT    2       23      0.001   1.5                                     CONT
529 -       CONT    2       24      0.05    1.28333
530 -       TPSSYM  4       4       4       4                                       CONT
531 -       CONT    4       21      0.01    2.                                      CONT
532 -       CONT    4       42      1.0     10.                                     CONT
533 -       CONT    4       23      0.001   1.5                                     CONT
534 -       CONT    4       24      0.05    1.4
535 -       TPSSYM  5       5       4       4                                       CONT
536 -       CONT    5       21      0.01    2.                                      CONT
537 -       CONT    5       42      1.0     10.                                     CONT
538 -       CONT    5       23      0.001   1.5                                     CONT
539 -       CONT    5       24      0.05    1.4
540 -       TPSSYM  6       6       4       4                                       CONT
541 -       CONT    6       21      0.01    2.                                      CONT
542 -       CONT    6       42      1.0     10.                                     CONT
543 -       CONT    6       23      0.001   1.5                                     CONT
544 -       CONT    6       24      0.05    1.4
545 -       TPSSYM  7       7       4       4                                       CONT
546 -       CONT    7       21      0.01    2.                                      CONT
547 -       CONT    7       42      1.0     10.                                     CONT
548 -       CONT    7       23      0.001   1.5                                     CONT
549 -       CONT    7       24      0.05    1.4
550 -       TPSSYM  8       8       4       4                                       CONT
551 -       CONT    8       21      0.01    2.                                      CONT
552 -       CONT    8       42      1.0     10.                                     CONT
553 -       CONT    8       23      0.001   1.5                                     CONT
554 -       CONT    8       24      0.05    1.4
555 -       TPSSYM  9       9       4       4                                       CONT
556 -       CONT    9       21      0.01    2.                                      CONT
557 -       CONT    9       42      1.0     10.                                     CONT
558 -       CONT    9       23      0.001   1.5                                     CONT
559 -       CONT    9       24      0.05    1.4
560 -       TPSSYM  10      10      5       4                                       CONT
561 -       CONT    10      11      0.01    2.                                      CONT
562 -       CONT    10      12      0.01    1.28333                                 CONT
563 -       CONT    10      13      1.0     10.                                     CONT
564 -       CONT    10      14      0.001   1.28333                                 CONT
565 -       CONT    10      15      0.05    1.28333
566 -       TPSSYM  11      11      4       4                                       CONT
567 -       CONT    11      21      0.01    2.                                      CONT
568 -       CONT    11      42      1.0     10.                                     CONT
569 -       CONT    11      23      0.001   1.5                                     CONT
570 -       CONT    11      24      0.05    1.4
571 -       TPSSYM  12      12      4       4                                       CONT
572 -       CONT    12      21      0.01    2.                                      CONT
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573 -       CONT    12      42      1.0     10.                             CONT
574 -       CONT    12      23      0.001   1.5                             CONT
575 -       CONT    12      24      0.05    1.4
576 -       TPSSYM  13      13      4       4                               CONT
577 -       CONT    13      21      0.01    2.                              CONT
578 -       CONT    13      42      1.0     10.                             CONT
579 -       CONT    13      23      0.001   1.5                             CONT
580 -       CONT    13      24      0.05    1.4
581 -       TPSSYM  14      14      4       4                               CONT
582 -       CONT    14      21      0.01    2.                              CONT
583 -       CONT    14      42      1.0     10.                             CONT
584 -       CONT    14      23      0.001   1.5                             CONT
585 -       CONT    14      24      0.05    1.4
586 -       TPSSYM  15      15      4       4                               CONT
587 -       CONT    15      21      0.01    2.                              CONT
588 -       CONT    15      42      1.0     10.                             CONT
589 -       CONT    15      23      0.001   1.5                             CONT
590 -       CONT    15      24      0.05    1.4
591 -       TPSSYM  16      16      4       4                               CONT
592 -       CONT    16      21      0.01    2.                              CONT
593 -       CONT    16      42      1.0     10.                             CONT
594 -       CONT    16      23      0.001   1.5                             CONT
595 -       CONT    16      24      0.05    1.4
596 -       TPSSYM  17      17      4       4                               CONT
597 -       CONT    17      21      0.01    2.                              CONT
598 -       CONT    17      42      1.0     10.                             CONT
599 -       CONT    17      23      0.001   1.5                             CONT
600 -       CONT    17      24      0.05    1.4
601 -       TPSSYM  18      18      4       4                               CONT
602 -       CONT    18      21      0.01    2.                              CONT
603 -       CONT    18      42      1.0     10.                             CONT
604 -       CONT    18      23      0.001   1.5                             CONT
605 -       CONT    18      24      0.05    1.4
606 -       TPSSYM  19      19      4       4                               CONT
607 -       CONT    19      21      0.01    2.                              CONT
608 -       CONT    19      42      1.0     10.                             CONT
609 -       CONT    19      23      0.001   1.5                             CONT
610 -       CONT    19      24      0.05    1.4
611 -       TPSSYM  20      20      4       4                               CONT
612 -       CONT    20      21      0.01    2.                              CONT
613 -       CONT    20      42      1.0     10.                             CONT
614 -       CONT    20      23      0.001   1.5                             CONT
615 -       CONT    20      24      0.05    1.4
616 -       TPSSYM  21      21      4       4                               CONT
617 -       CONT    21      21      0.01    2.                              CONT
618 -       CONT    21      42      1.0     10.                             CONT
619 -       CONT    21      23      0.001   1.5                             CONT
620 -       CONT    21      24      0.05    1.4
621 -       TPSSYM  22      22      4       4                               CONT
622 -       CONT    22      21      0.01    2.                              CONT
623 -       CONT    22      42      1.0     10.                             CONT
624 -       CONT    22      23      0.001   1.5                             CONT
625 -       CONT    22      24      0.05    1.4
626 -       TPSSYM  23      23      4       4                               CONT
627 -       CONT    23      21      0.01    2.                              CONT
628 -       CONT    23      42      1.0     10.                             CONT
629 -       CONT    23      23      0.001   1.5                             CONT
630 -       CONT    23      24      0.05    1.4
631 -       TPSSYM  24      24      4       4                               CONT
632 -       CONT    24      21      0.01    2.                              CONT
633 -       CONT    24      42      1.0     10.                             CONT
634 -       CONT    24      23      0.001   1.5                             CONT
635 -       CONT    24      24      0.05    1.4
636 -       TPSSYM  25      25      4       4                               CONT
637 -       CONT    25      21      0.01    2.                              CONT
638 -       CONT    25      42      1.0     10.                             CONT
639 -       CONT    25      23      0.001   1.5                             CONT
640 -       CONT    25      24      0.05    1.4
641 -       TPSSYM  26      26      4       4                               CONT
642 -       CONT    26      21      0.01    2.                              CONT
643 -       CONT    26      42      1.0     10.                             CONT
644 -       CONT    26      23      0.001   1.5                             CONT
645 -       CONT    26      24      0.05    1.4
646 -       TPSSYM  27      27      4       4                               CONT
647 -       CONT    27      21      0.01    2.                              CONT
648 -       CONT    27      42      1.0     10.                             CONT
649 -       CONT    27      23      0.001   1.5                             CONT
650 -       CONT    27      24      0.05    1.4
651 -       TPSSYM  28      28      4       4                               CONT
652 -       CONT    28      21      0.01    2.                              CONT
653 -       CONT    28      42      1.0     10.                             CONT
654 -       CONT    28      23      0.001   1.5                             CONT
655 -       CONT    28      24      0.05    1.4
656 -       TPSSYM  29      29      5       4                               CONT
657 -       CONT    29      11      0.01    2.                              CONT
658 -       CONT    29      12      0.01    1.28333                         CONT
659 -       CONT    29      13      1.0     10.                             CONT
660 -       CONT    29      14      0.001   1.28333                         CONT
661 -       CONT    29      15      0.05    1.28333
662 -       TPSSYM  30      30      5       4                               CONT
663 -       CONT    30      11      0.01    2.                              CONT
664 -       CONT    30      12      0.01    1.28333                         CONT
665 -       CONT    30      13      1.0     10.                             CONT
666 -       CONT    30      14      0.001   1.28333                         CONT
667 -       CONT    30      15      0.05    1.28333
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668 -       TRAJCT  1       1                                                       CONT
669 -       CONT    0.0     26.800  4800000.10.0            TECPLOT CPTEMP1.PLT     CONT
670 -       CONT    30.0    26.900  4572000.30.0                                    CONT
671 -       CONT    70.0    26.900  4260000.30.0                                    CONT
672 -       CONT    110.0   26.900  3948000.30.0                                    CONT
673 -       CONT    150.0   26.900  3636000.30.0                                    CONT
674 -       CONT    190.0   26.600  3336000.30.0                                    CONT
675 -       CONT    230.0   25.600  2748000.30.0                                    CONT
676 -       CONT    270.0   24.900  3012000.30.0                                    CONT
677 -       CONT    310.0   24.700  3108000.30.0                                    CONT
678 -       CONT    350.0   25.100  3300000.30.0                                    CONT
679 -       CONT    390.0   25.400  3492000.30.0                                    CONT
680 -       CONT    430.0   25.300  3648000.30.0                                    CONT
681 -       CONT    470.0   25.300  3756000.30.0                                    CONT
682 -       CONT    510.0   25.200  3792000.30.0                                    CONT
683 -       CONT    550.0   25.200  3768000.30.0                                    CONT
684 -       CONT    590.0   25.200  3672000.30.0                                    CONT
685 -       CONT    630.0   25.200  3528000.30.0                                    CONT
686 -       CONT    670.0   24.800  3324000.30.0                                    CONT
687 -       CONT    710.0   23.900  3108000.30.0                                    CONT
688 -       CONT    750.0   23.100  2952000.30.0                                    CONT
689 -       CONT    790.0   22.500  2940000.30.0                                    CONT
690 -       CONT    830.0   22.300  3048000.30.0                                    CONT
691 -       CONT    870.0   22.400  3168000.30.0                                    CONT
692 -       CONT    910.0   22.400  3240000.30.0                                    CONT
693 -       CONT    950.0   22.200  3228000.30.0                                    CONT
694 -       CONT    990.0   21.700  3120000.30.0            TECPLOT CPTEMP2.PLT     CONT
695 -       CONT    1030.0  21.000  2964000.30.0                                    CONT
696 -       CONT    1070.0  20.100  2820000.30.0                                    CONT
697 -       CONT    1110.0  19.400  2796000.30.0                                    CONT
698 -       CONT    1150.0  18.900  2868000.30.0                                    CONT
699 -       CONT    1190.0  18.600  2916000.30.0                                    CONT
700 -       CONT    1230.0  18.200  2904000.30.0                                    CONT
701 -       CONT    1270.0  17.500  2808000.30.0                                    CONT
702 -       CONT    1310.0  16.500  2688000.30.0                                    CONT
703 -       CONT    1350.0  15.500  2616000.30.0                                    CONT
704 -       CONT    1390.0  14.800  2628000.30.0                                    CONT
705 -       CONT    1430.0  14.100  2640000.30.0                                    CONT
706 -       CONT    1470.0  13.300  2592000.30.0                                    CONT
707 -       CONT    1510.0  12.400  2496000.30.0                                    CONT
708 -       CONT    1550.0  11.400  2400000.30.0                                    CONT
709 -       CONT    1590.0  10.300  2352000.30.0            TECPLOT CPTEMP3.PLT     CONT
710 -       CONT    1630.0  9.400   2316000.30.0                                    CONT
711 -       CONT    1670.0  8.480   2256000.30.0                                    CONT
712 -       CONT    1710.0  7.490   2148000.30.0                                    CONT
713 -       CONT    1750.0  6.440   2040000.30.0                                    CONT
714 -       CONT    1790.0  5.470   1932000.30.0                                    CONT
715 -       CONT    1830.0  4.550   1824000.30.0                                    CONT
716 -       CONT    1870.0  3.710   1716000.30.0                                    CONT
717 -       CONT    1910.0  2.890   1572000.30.0                                    CONT
718 -       CONT    1950.0  2.140   1428000.30.0
719 -       TRJLST  1                                                               CONT
720 -       CONT    1       1.
721 -       ENDDATA
```

```
      ****************************************
      *                                      *
      *       SUBCASE       =        1       *
      *       DISCIPLINE    = TPSDES         *
      *       BULK ENTRY ID =        1       *
      *                                      *
      ****************************************
```

```
      OPTIMIZATION SYSTEM FOR TPSSYM =     1


 OBJECTIVE FUNCTION VS ITERATIONS FOR NODE =          1
           1   1.000000
           2  0.8619470
           3  0.6555990
           4  0.1992105
           5  0.1927428
           6  0.1787381
           7  0.1509816
           8  0.1098324
           9  0.1873981
          10  0.1098324
          11  0.1178954
          12  0.1161861
          13  0.1148047
          14  0.1403729
          15  0.1130093
          16  0.1380401
          17  0.1122150
          18  0.1384899
          19  0.1128107
          20  0.1381724
          21  0.1148047
          22  0.1228500
```

```
         23  0.1168473
         24  0.1151548
         25  0.1148693
         26  0.1193772
         27  0.1157456
         28  0.1149580
         29  0.1156361
         30  0.1149406
         31  0.1148047
         32  0.1148604

 OBJECTIVE FUNCTION VS ITERATIONS FOR NODE =           2
          1   1.000000
          2  0.8619470
          3  0.6555990
          4  0.1992105
          5  0.1927428
          6  0.1787381
          7  0.1509816
          8  0.1098324
          9  0.1619511
         10  0.1482310
         11  0.1384977
         12  0.1466411
         13  0.1498380
         14  0.1513185
         15  0.1521285
         16  0.1525497
         17  0.1433644
         18  0.1459661
         19  0.1466090
         20  0.1430387
         21  0.1457928
         22  0.1466051
         23  0.1431651
         24  0.1458006
         25  0.1465679
         26  0.1445534
         27  0.1487602
         28  0.1470972
         29  0.1476513
         30  0.1454385
         31  0.1466468
         32  0.1459758
         33  0.1464297
         34  0.1459539
         35  0.1464241
         36  0.1451332
         37  0.1491063
         38  0.1485837
         39  0.1457786
         40  0.1474750
         41  0.1456173
         42  0.1480470
         43  0.1457383
         44  0.1477097
         45  0.1464241

 OBJECTIVE FUNCTION VS ITERATIONS FOR NODE =           3
          1   1.000000
          2  0.8619470
          3  0.6555990
          4  0.1992105
          5  0.1927428
          6  0.1787381
          7  0.1509816
          8  0.1943640
          9  0.1098324
         10  0.1613127
         11  0.1542900
         12  0.1434504
         13  0.1544319
         14  0.1589835
         15  0.1613415
         16  0.1626578
         17  0.1634029
         18  0.1638218
         19  0.1640624
         20  0.1488702
         21  0.1525284
         22  0.1534407
         23  0.1537016
         24  0.1499756
         25  0.1529160
         26  0.1537117
         27  0.1539558
         28  0.1487054
         29  0.1525009
         30  0.1534694
         31  0.1538033
         32  0.1522575
         33  0.1526673
         34  0.1549307
         35  0.1524106
         36  0.1530485
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         37  0.1536698
         38  0.1522680
         39  0.1531929
         40  0.1523351
         41  0.1496977
         42  0.1558923
         43  0.1509828
         44  0.1540505
         45  0.1468836
         46  0.1551150
         47  0.1547381
         48  0.1519669
         49  0.1524779
         50  0.1496977
         51  0.1558923
         52  0.1509828
         53  0.1540505
         54  0.1468836
         55  0.1551150
         56  0.1547381
         57  0.1519669
         58  0.1524779
         59  0.1522680
         60  0.1524107
         61  0.1525274

 OBJECTIVE FUNCTION VS ITERATIONS FOR NODE =          4
          1   1.000000
          2  0.8619470
          3  0.6555990
          4  0.1992105
          5  0.1927428
          6  0.1787381
          7  0.1509816
          8  0.1875214
          9  0.1098324
         10  0.1657731
         11  0.1599743
         12  0.1479175
         13  0.1617407
         14  0.1678228
         15  0.1711528
         16  0.1731032
         17  0.1743192
         18  0.1750919
         19  0.1755755
         20  0.1758803
         21  0.1539459
         22  0.1590738
         23  0.1607162
         24  0.1613934
         25  0.1616629
         26  0.1555961
         27  0.1593449
         28  0.1577646
         29  0.1585333
         30  0.1582286
         31  0.1585263
         32  0.1592863
         33  0.1585323
         34  0.1587316
         35  0.1584627
         36  0.1546549
         37  0.1660913
         38  0.1692441
         39  0.1705153
         40  0.1710598
         41  0.1565588
         42  0.1610985
         43  0.1620035
         44  0.1560828
         45  0.1621306
         46  0.1633436
         47  0.1636883
         48  0.1564398
         49  0.1612751
         50  0.1623059
         51  0.1625859
         52  0.1584627
         53  0.1585535

 TOTAL NUMBER OF DESIGN VARIABLES =   30
 TOTAL NUMBER OF CONSTRAINS       = 1740
 TOTAL NUMBER OF TEMP. CONSTRAINS = 1400
 TOTAL NUMBER OF TEMP. PRINTOUTS  =   40


MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
    X   0.2798E+04
   1.0 B
       |  B  B
       C  C     B  B  B  B   B  B  B  B
       |     C  C  C  C  C   C  C  C  C  C  C  C  C  C  C  B  B  B   B  B
       |                                                  C  C  C   C  C  C  C  C  C  C  B  B  B
       |                                                                                 C  C  C  C  C  C   C  C
```

```
     |                                                                                                              B  B
     |                                                                                                                    B  B
     E  E  E  E  E  E  E   E                                                                                          C        B
     |                        E  E  E  E  E  E  E  E  E  E  E  E   E  E  E  E                                             C
 0.0 +-----------+-----------+-----------+-----------+-----------+-----------+-E--E--E--E+-E--E--E--E+-E---E--E--E--E--E--E--+
     |
     |
     |
     |
     |
     |
     |
     |
-1.0 +
     .03         .13         .23         .33         .43         .53         .63         .73         .83         .93       1.03
                                                                   TIME  ( X 5.605E-44 )
```

```
               MAXIMUM TEMPERATURE OF EVERY LAYER
LAYER:        1        2        3        4        5
Tmax:   2800.33  2900.33  2700.33   550.33   600.33
Optv:   2797.91  2797.91  2122.77   549.98   549.98

                    VALUES OF DESIGN VARIABLES :
LAYER    DEV01    DEV02    DEV03    DEV04    DEV05    DEV06
    1  0.03287  0.03064  0.04464  0.04156  0.26692  0.23816
    2  0.01000  0.01000  0.01000  0.04437  0.01000  0.01000
    3  1.00000  1.25496  1.37562  1.46831  1.57187  1.97282
    4  0.01488  0.04355  0.03019  0.02513  0.03313  0.00103
    5  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000

 THE ORIGINAL OBJECTIVE FUNCTION =     852.1166992

 THE RATIO OF OPTIMAL OBJECTIVE FUNCTION =   0.2050737

 THE TOTAL OPTIMAL WEIGHT = 1.95336740E+04
```

```
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
    X   0.1674E+01
 1.0 +                                                                                           A
     |
     |                                                                                                  A      A      A
     |
     |
     |
     |
     |             A   A  A   A  A   A                       A   A   A  A
     A   A  A   A                       A   A  A   A  A   A                  A  A   A  A   A  A   A      A      A      A
 0.0 +-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+
     |
     |
     |
     |
     |
     |
     |
     |
-1.0 +
     .03         .13         .23         .33         .43         .53         .63         .73         .83         .93       1.03
                                                                   TIME  ( X 4.204E-44 )
```

```
              OPTIMAL STRUCTURES OF TPS FOR PATCH =       1
                     (WITH AVERAGE THICKNESS)
 ============================================================   -----
                      ACC((N)             thin skin             0.09516 in.  2797.9 F
 ============================================================   -----
           0.03000 in. ZIRCONIUM                                  i
 ------------------------------------------------------------    i
                                                                  i
                                          radiation gap         0.01491 in.  2797.9 F
                                                                  i
 ------------------------------------------------------------    i
           0.03000 in. ZIRCONIUM                                  i
 ============================================================   -----
                                                                  i
                      LI-2200 (N)         slab                  1.41006 in.  2122.8 F
                                                                  i
 ============================================================   -----
                      RTV-560             thin skin             0.02467 in.   550.0 F
 ============================================================   -----
                                                                  i
                      17 LB SIP .16 IN    slab                  0.05000 in.   550.0 F
                                                                  i
 ============================================================   -----


         THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =       1

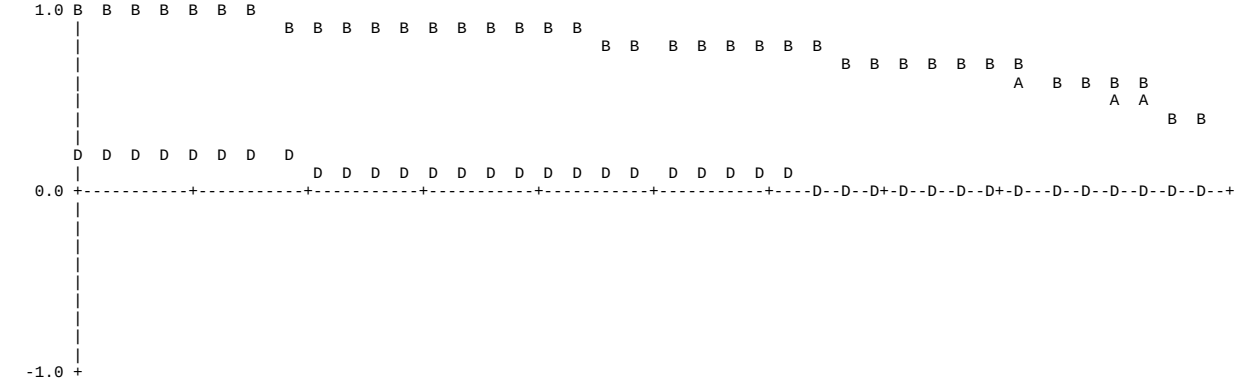
   PANEL   LAYER01            LAYER02            LAYER03            LAYER04            LAYER05
     201   0.03064   2351.16  0.01000   2351.16  1.25496   1633.90  0.04355    547.31  0.05000    547.31
     202   0.01912   2359.71  0.01879   2359.71  1.24416   1992.25  0.03887    550.33  0.05000    549.98
```

203	0.01293	2381.98	0.02377	2381.98	1.25079	2007.95	0.03592	550.33	0.05000	549.98
204	0.01014	2416.95	0.02725	2416.95	1.26834	2037.49	0.03412	550.33	0.05000	549.98
205	0.01000	2462.39	0.03049	2462.39	1.29372	2078.14	0.03296	550.33	0.05000	549.98
206	0.01245	2514.58	0.03406	2514.58	1.32568	2126.11	0.03191	550.33	0.05000	549.98
207	0.01801	2568.45	0.03787	2568.45	1.36428	2176.61	0.03047	550.33	0.05000	549.98
208	0.02738	2619.10	0.04137	2619.10	1.41037	2225.20	0.02831	550.33	0.05000	549.98
209	0.04156	2666.28	0.04437	2666.28	1.46831	1877.65	0.02513	546.04	0.05000	546.04
210	0.05958	2688.91	0.04111	2688.91	1.51658	2297.57	0.02266	550.33	0.05000	531.04
211	0.07904	2710.29	0.03771	2710.29	1.56356	2322.86	0.02063	550.33	0.05000	516.20
212	0.09982	2730.27	0.03452	2730.27	1.61200	2347.47	0.01858	550.33	0.05000	500.41
213	0.11542	2743.09	0.03221	2743.09	1.64794	2364.01	0.01703	550.33	0.05000	488.19
214	0.12471	2749.92	0.03085	2749.92	1.66953	2373.13	0.01607	550.33	0.05000	480.60
215	0.13439	2756.47	0.02945	2756.47	1.69258	2382.12	0.01500	550.33	0.05000	472.30
216	0.14451	2762.71	0.02795	2762.71	1.71722	2390.97	0.01383	550.33	0.05000	463.20
217	0.16023	2771.15	0.02548	2771.15	1.75588	2403.57	0.01197	550.33	0.05000	448.50
218	0.18280	2781.10	0.02161	2781.10	1.81346	2419.72	0.00914	550.33	0.05000	425.73
219	0.20833	2789.98	0.01669	2789.98	1.88388	2435.80	0.00556	550.33	0.05000	396.67
220	0.23816	2797.91	0.01000	2797.91	1.97282	2106.89	0.00103	358.58	0.05000	358.58
1	0.17569	1793.10	0.01000	1793.10	1.52794	1125.96	0.03345	549.98	0.05000	549.98
2	0.20162	2765.30	0.01000	2765.30	1.54309	2416.18	0.03347	550.33	0.05000	547.62
3	0.23121	2775.38	0.01000	2775.38	1.55758	2435.07	0.03338	550.33	0.05000	547.56
4	0.26692	2781.20	0.01000	2781.20	1.57187	2451.99	0.03313	550.33	0.05000	547.51
50	0.12499	2706.66	0.01000	2706.66	1.48919	2337.06	0.03302	550.33	0.05000	547.84
60	0.13543	2718.35	0.01000	2718.35	1.49839	2351.27	0.03316	550.33	0.05000	547.80
70	0.14594	2728.70	0.01000	2728.70	1.50695	2364.26	0.03327	550.33	0.05000	547.77
80	0.15750	2738.63	0.01000	2738.63	1.51562	2377.20	0.03336	550.33	0.05000	547.73
90	0.04464	2531.84	0.01000	2531.84	1.37562	2148.92	0.03019	550.33	0.05000	548.32
100	0.06259	2591.61	0.01000	2591.61	1.41141	2210.17	0.03126	550.33	0.05000	548.17
110	0.08281	2640.19	0.01000	2640.19	1.44230	2261.77	0.03206	550.33	0.05000	548.04
120	0.10648	2681.85	0.01000	2681.85	1.47081	2308.06	0.03269	550.33	0.05000	547.92
130	0.03287	1793.10	0.01000	1793.10	1.00000	1459.53	0.01488	550.33	0.05000	549.98
140	0.01967	1943.26	0.01000	1943.26	1.07139	1594.63	0.01815	550.33	0.05000	549.66
150	0.01306	2058.05	0.01000	2058.05	1.12707	1699.03	0.02062	550.33	0.05000	549.41
160	0.01042	2156.34	0.01000	2156.34	1.17570	1789.40	0.02270	550.33	0.05000	549.20
170	0.01137	2257.38	0.01000	2257.38	1.22687	1883.47	0.02480	550.33	0.05000	548.97
180	0.01456	2324.09	0.01000	2324.09	1.26147	1946.41	0.02616	550.33	0.05000	548.82
190	0.02105	2397.32	0.01000	2397.32	1.30039	2016.47	0.02762	550.33	0.05000	548.65
200	0.03067	2465.20	0.01000	2465.20	1.33762	2082.57	0.02894	550.33	0.05000	548.49

OPTIMIZATION SYSTEM FOR TPSSYM = 2

TOTAL NUMBER OF DESIGN VARIABLES = 48
TOTAL NUMBER OF CONSTRAINS = 2304
TOTAL NUMBER OF TEMP. CONSTRAINS = 1920
TOTAL NUMBER OF TEMP. PRINTOUTS = 40

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



MAXIMUM TEMPERATURE OF EVERY LAYER

LAYER:	1	2	3	4
Tmax:	2300.33	2700.33	550.33	600.33
Optv:	2283.92	2283.92	483.58	483.58

VALUES OF DESIGN VARIABLES :

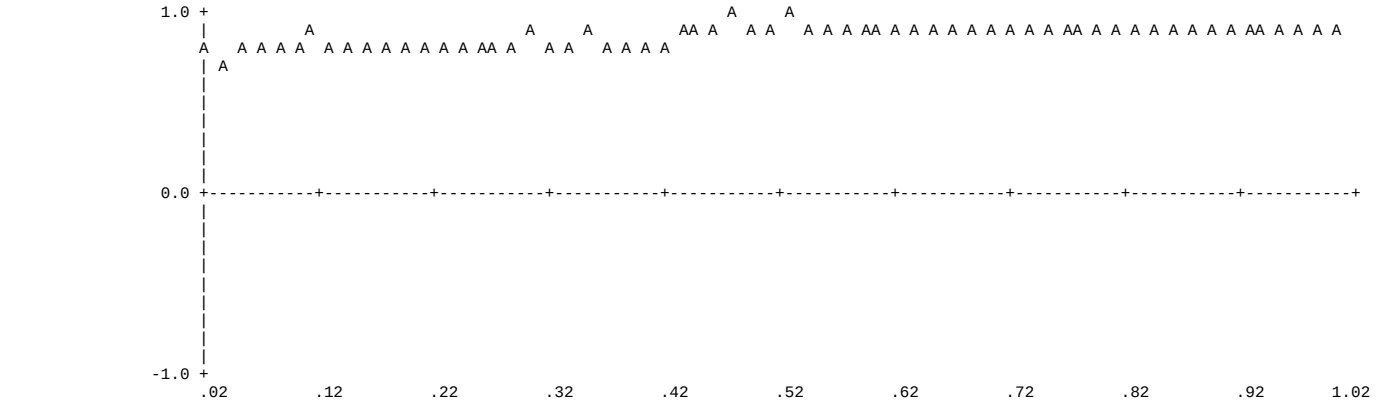
LAYER	DEV01	DEV02	DEV03	DEV04	DEV05	DEV06	DEV07	DEV08	DEV09	DEV10	DEV11	DEV12
1	0.73781	0.69224	0.57214	0.46749	0.39408	0.29810	0.44762	0.33980	0.01026	0.01000	0.31320	0.35115
2	3.24830	3.30871	2.06826	1.90442	2.52073	2.84569	2.74102	2.98440	1.50063	1.34451	1.31592	1.26102
3	0.00100	0.39754	0.15027	0.01304	0.22097	0.07041	0.02557	0.01738	0.03615	0.31394	0.48671	0.04101
4	0.05000	0.99874	1.19830	0.06620	0.17348	0.07686	0.09637	0.19394	0.21222	0.07586	0.08690	0.05000

THE ORIGINAL OBJECTIVE FUNCTION = 373.1199036

THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 1.4369892

THE TOTAL OPTIMAL WEIGHT = 2.68273188E+05

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



OPTIMAL STRUCTURES OF TPS FOR PATCH = 2
(WITH AVERAGE THICKNESS)

HRSI COAT	thin skin	0.38616 in.	2283.9 F
LI-2200 (N)	slab	2.25364 in.	2283.9 F
RTV-560	thin skin	0.14783 in.	483.6 F
17 LB SIP .16 IN	slab	0.27324 in.	483.6 F

THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH = 2

PANEL	LAYER01		LAYER02		LAYER03		LAYER04	
5	0.64710	2269.82	2.93327	2269.82	0.38086	550.33	1.19493	119.15
6	0.69224	2283.92	3.30871	2283.92	0.39754	550.33	0.99874	101.07
7	0.72051	2250.00	3.40285	2250.00	0.27054	404.65	0.61112	404.65
8	0.73781	2282.83	3.24830	2282.83	0.00100	550.33	0.05000	111.89
9	0.53735	2210.20	2.78215	2210.20	0.35595	550.33	0.65145	101.07
10	0.55314	2176.90	2.70922	2176.90	0.38282	111.35	0.57377	111.35
11	0.56650	2266.99	2.53616	2266.99	0.26547	550.33	0.36113	194.55
12	0.58133	2281.52	2.30041	2281.52	0.02090	550.33	0.05000	302.83
13	0.43711	2241.18	2.72121	2241.18	0.28968	167.38	0.31947	167.38
14	0.45580	2240.97	2.48400	2240.97	0.31572	550.33	0.30841	118.90
15	0.47541	2263.76	2.20021	2263.76	0.22113	550.33	0.21412	227.59
16	0.49833	2273.21	1.90030	2273.21	0.02181	550.33	0.05617	378.17
17	0.35190	2235.93	2.71495	2235.93	0.20358	550.33	0.15783	101.07
18	0.39408	2261.53	2.52073	2261.53	0.22097	550.33	0.17349	115.91
19	0.43195	2269.74	2.25113	2269.74	0.15540	550.33	0.14147	212.79
20	0.46749	2260.01	1.90442	2260.01	0.01304	550.33	0.06620	366.29
21	0.28556	2274.90	2.71157	2274.90	0.11811	550.33	0.11798	109.83
22	0.35949	2283.92	2.69799	2283.92	0.12304	550.33	0.13298	110.50
23	0.41999	2276.38	2.50887	2276.38	0.08266	550.33	0.11901	175.34
24	0.46471	1625.84	2.15193	1625.84	0.00428	483.58	0.07778	483.58
25	0.24057	2196.44	2.67382	2196.44	0.05076	255.04	0.15281	255.04
26	0.34403	2283.92	2.89356	2283.92	0.04676	550.33	0.15174	107.10
27	0.42011	1835.40	2.83046	1835.40	0.03048	199.89	0.13046	199.89
28	0.46610	2227.27	2.48508	2227.27	0.00522	550.33	0.08865	207.55
29	0.22058	2280.48	2.55384	2280.48	0.02200	550.33	0.21489	200.64
30	0.33980	2280.45	2.98440	2280.45	0.01738	550.33	0.19394	109.92
31	0.41533	2257.10	3.04562	2257.10	0.01867	550.33	0.15476	101.07
32	0.44762	2212.00	2.74102	2212.00	0.02557	550.33	0.09637	124.24
33	0.23291	2198.58	2.32522	2198.58	0.05026	550.33	0.25735	241.65
34	0.33883	2212.63	2.84898	2212.63	0.05982	550.33	0.22357	122.99
35	0.38974	2212.17	2.99198	2212.17	0.06916	550.33	0.17045	101.07
36	0.38512	2200.25	2.76058	2200.25	0.07518	550.33	0.09866	101.07
37	0.27873	2026.98	1.93446	2026.98	0.15567	550.33	0.23213	270.64
38	0.33325	2077.41	2.36529	2077.41	0.19926	550.33	0.20429	150.27
39	0.32489	2131.64	2.50799	2131.64	0.20442	550.33	0.15709	101.07
40	0.25434	2194.18	2.38142	2194.18	0.16387	550.33	0.09316	108.41
61	0.11692	1979.40	1.00072	1979.40	0.03542	550.33	0.24485	483.58
62	0.01823	2166.54	1.13103	2166.54	0.03366	550.33	0.27243	483.58
63	0.01026	2250.00	1.50063	2250.00	0.03615	550.33	0.21222	404.65
64	0.06953	2259.70	1.98858	2259.70	0.04292	550.33	0.12151	302.40
65	0.17323	2225.39	2.47685	2225.39	0.05426	550.33	0.05735	197.64
66	0.29810	2176.90	2.84569	2176.90	0.07041	550.33	0.07686	111.35
67	0.42138	2143.85	2.97782	2143.85	0.09164	550.33	0.23659	101.07
68	0.52054	2155.83	2.75475	2155.83	0.11832	550.33	0.59429	101.07
69	0.57214	2241.18	2.06826	2241.18	0.15027	550.33	1.19830	167.38
71	0.19410	1995.47	1.42465	1995.47	0.09110	550.33	0.24262	407.57
72	0.11377	2180.79	1.67209	2180.79	0.04053	550.33	0.27028	376.33
73	0.10086	2265.96	1.98072	2265.96	0.02946	550.33	0.21734	312.87
74	0.14054	2279.39	2.30420	2279.39	0.04787	550.33	0.13840	233.26

75	0.21833	2249.25	2.59752	2249.25	0.08683	550.33	0.08649	152.55
76	0.31866	2203.63	2.80772	2203.63	0.13731	550.33	0.11640	101.07
77	0.42584	2170.55	2.88664	2170.55	0.18964	550.33	0.28049	101.07
78	0.52637	2177.80	2.78515	2177.80	0.23514	550.33	0.63568	101.07
79	0.60444	2253.67	2.46700	2253.67	0.26919	550.33	1.22912	144.51
365	0.37034	1654.53	1.27531	1654.53	0.19848	550.33	0.06270	388.97
377	0.35115	1625.84	1.26102	1625.84	0.04101	550.33	0.05000	483.58
413	0.01000	2196.44	1.34451	2196.44	0.31394	550.33	0.07586	255.04
425	0.19468	1993.78	1.33249	1993.78	0.46823	550.33	0.08660	190.94
437	0.31320	1835.40	1.31592	1835.40	0.48671	550.33	0.08690	199.89
449	0.36931	1717.61	1.29472	1717.61	0.37374	550.33	0.07707	279.81

OPTIMIZATION SYSTEM FOR TPSSYM =   30

TOTAL NUMBER OF DESIGN VARIABLES =   45
TOTAL NUMBER OF CONSTRAINS   = 2745
TOTAL NUMBER OF TEMP. CONSTRAINS = 585
TOTAL NUMBER OF TEMP. PRINTOUTS =   13
WARNING: MODIFICATION EXEEDS ALLOWED VALUE

```
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
    X   0.2036E+04
   1.0 B         B         B
       |                     B         B
       C         C         C         C                   B         B
       |                                       C         C                   B         B
       |                                                           C         C         C         C
       |                                                                                           C
       |
       E                                                                                                   B
       |         E         E         E         E
       |                                                 E         E         E         E         E                   C
   0.0 +-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+---E-------+-E---------+
       |
       |
       |
       |
       |
       |
       |
       |
       |
  -1.0 +
       .08         .18         .28         .38         .48         .58         .68         .78         .88         .98       1.08
                                                             TIME  ( X 1.401E-44 )
```

MAXIMUM TEMPERATURE OF EVERY LAYER

LAYER:	1	2	3	4	5
Tmax:	2800.33	2900.33	2700.33	550.33	600.33
Optv:	2036.22	2036.22	1726.37	548.47	548.47

VALUES OF DESIGN VARIABLES :

LAYER	DEV01	DEV02	DEV03	DEV04	DEV05	DEV06	DEV07	DEV08	DEV09
1	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000
2	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000
3	1.00000	1.00000	1.00000	1.00000	1.23009	1.00000	1.00000	1.22957	1.03625
4	0.00100	0.02994	0.00175	0.00109	0.06513	0.00333	0.00111	0.08491	0.00567
5	0.05000	0.07508	0.07814	0.05000	0.12918	0.07310	0.05000	0.05000	0.05000

THE ORIGINAL OBJECTIVE FUNCTION =   4793.1660156

THE RATIO OF OPTIMAL OBJECTIVE FUNCTION =   0.1337998

THE TOTAL OPTIMAL WEIGHT = 7.82763492E+04

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MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
    X   0.4258E+01
   1.0 +                                                              A AA AA AA A      A  A A A A AA AA AA A AA AA AA AA AA AA
       |
       |
       |                                                                          A AA A
       |
       |
       |
       |                                                                                 A A  A A
       |
       |   A                                                                                                             A
   0.0 AAAA-AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA-AA-AA-AA+AA-AA-A-A-A+A-A--AA-AA-AA-AA-AA-AA-AA-AA--A-AA-+
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     |
-1.0 +
     .01         .11         .21         .31         .41         .51         .61         .71         .81         .91       1.01
                                                              TIME  ( X 2.242E-43 )
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OPTIMAL STRUCTURES OF TPS FOR PATCH = 30
(WITH AVERAGE THICKNESS)

ACC((N)	thin skin	0.01000 in.	2036.2 F
0.03000 in. ZIRCONIUM			
	radiation gap	0.01000 in.	2036.2 F
0.03000 in. ZIRCONIUM			
LI-2200 (N)	slab	1.05510 in.	1726.4 F
RTV-560	thin skin	0.02155 in.	548.5 F
17 LB SIP .16 IN	slab	0.06728 in.	548.5 F

THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH = 30

PANEL	LAYER01		LAYER02		LAYER03		LAYER04		LAYER05	
10421	0.01000	1331.94	0.01000	1331.94	1.00000	1148.83	0.01207	550.33	0.07882	494.78
10435	0.01000	1151.03	0.01000	1151.03	1.00000	952.80	0.00200	550.33	0.05058	364.87
10001	0.01000	1439.15	0.01000	1439.15	1.03625	1247.46	0.00567	550.33	0.05000	548.47
10002	0.01000	1720.21	0.01000	1720.21	1.12926	1543.17	0.04300	550.33	0.05000	496.02
10003	0.01000	1839.35	0.01000	1839.35	1.16953	1668.55	0.05936	550.33	0.05000	469.95
10004	0.01000	1929.36	0.01000	1929.36	1.20086	1763.29	0.07228	550.33	0.05000	446.09
10005	0.01000	1982.15	0.01000	1982.15	1.22049	1818.90	0.08064	550.33	0.05000	426.43
10006	0.01000	2001.18	0.01000	2001.18	1.22957	1839.00	0.08491	550.33	0.05000	410.21
10007	0.01000	1988.07	0.01000	1988.07	1.22858	1825.34	0.08504	550.33	0.05061	397.43
10008	0.01000	1940.61	0.01000	1940.61	1.21691	1775.56	0.08103	550.33	0.05119	387.98
10009	0.01000	1872.66	0.01000	1872.66	1.19842	1704.19	0.07445	550.33	0.05128	382.56
10010	0.01000	1798.40	0.01000	1798.40	1.17749	1626.16	0.06697	550.33	0.05098	379.88
10011	0.01000	1708.02	0.01000	1708.02	1.15152	1531.18	0.05753	550.33	0.05070	378.83
10012	0.01000	1601.67	0.01000	1601.67	1.12056	1419.40	0.04615	550.33	0.05043	379.42
10013	0.01000	1479.46	0.01000	1479.46	1.08463	1290.95	0.03283	550.33	0.05022	381.65
10014	0.01000	1341.54	0.01000	1341.54	1.04378	1145.98	0.01757	550.33	0.05006	385.53
10015	0.01000	1194.63	0.01000	1194.63	1.00000	991.54	0.00111	550.33	0.05000	390.83
10016	0.01000	1419.17	0.01000	1419.17	1.02784	1227.00	0.00521	550.33	0.05508	547.43
10017	0.01000	1731.43	0.01000	1731.43	1.12986	1555.62	0.04146	550.33	0.06253	498.63
10018	0.01000	1867.46	0.01000	1867.46	1.17517	1698.84	0.05766	550.33	0.06612	473.54
10019	0.01000	1966.45	0.01000	1966.45	1.20904	1803.10	0.06979	550.33	0.06903	451.56
10020	0.01000	2029.02	0.01000	2029.02	1.23168	1869.07	0.07789	550.33	0.07129	432.63
10021	0.01000	2036.22	0.01000	2036.22	1.24320	1881.30	0.08202	550.33	0.07288	416.69
10022	0.01000	2036.22	0.01000	2036.22	1.24340	1881.30	0.08222	550.33	0.07348	403.46
10023	0.01000	1995.93	0.01000	1995.93	1.23194	1834.74	0.07841	550.33	0.07297	393.01
10024	0.01000	1924.72	0.01000	1924.72	1.21311	1759.98	0.07209	550.33	0.07159	386.38
10025	0.01000	1846.62	0.01000	1846.62	1.19164	1677.93	0.06488	550.33	0.06978	382.45
10026	0.01000	1749.79	0.01000	1749.79	1.16447	1576.18	0.05577	550.33	0.06729	379.78
10027	0.01000	1634.00	0.01000	1634.00	1.13154	1454.48	0.04477	550.33	0.06408	378.37
10028	0.01000	1498.99	0.01000	1498.99	1.09278	1312.57	0.03186	550.33	0.06010	378.22
10029	0.01000	1344.50	0.01000	1344.50	1.04811	1150.17	0.01703	550.33	0.05533	379.31
10030	0.01000	1178.99	0.01000	1178.99	1.00000	976.15	0.00111	550.33	0.05000	381.50
10031	0.01000	1401.50	0.01000	1401.50	1.02042	1209.04	0.00479	550.33	0.05965	546.45
10032	0.01000	1737.13	0.01000	1737.13	1.12906	1562.37	0.03988	550.33	0.07378	500.54
10033	0.01000	1883.71	0.01000	1883.71	1.17748	1716.73	0.05558	550.33	0.08022	476.62
10034	0.01000	1990.44	0.01000	1990.44	1.21374	1829.17	0.06733	550.33	0.08512	455.42
10035	0.01000	2036.22	0.01000	2036.22	1.23804	1881.30	0.07518	550.33	0.08853	436.86
10036	0.01000	2036.22	0.01000	2036.22	1.25051	1881.30	0.07917	550.33	0.09043	420.89
10037	0.01000	2036.22	0.01000	2036.22	1.25107	1881.30	0.07936	550.33	0.09059	407.26
10038	0.01000	2024.47	0.01000	2024.47	1.23937	1865.63	0.07567	550.33	0.08888	396.06
10039	0.01000	1949.60	0.01000	1949.60	1.21995	1787.01	0.06955	550.33	0.08594	388.54
10040	0.01000	1867.56	0.01000	1867.56	1.19775	1700.79	0.06258	550.33	0.08248	383.71
10041	0.01000	1765.99	0.01000	1765.99	1.16967	1594.04	0.05379	550.33	0.07803	379.99
10042	0.01000	1644.72	0.01000	1644.72	1.13565	1466.56	0.04318	550.33	0.07255	377.37
10043	0.01000	1503.58	0.01000	1503.58	1.09564	1318.16	0.03073	550.33	0.06600	375.85
10044	0.01000	1342.39	0.01000	1342.39	1.04959	1148.67	0.01645	550.33	0.05835	375.43
10045	0.01000	1169.79	0.01000	1169.79	1.00000	967.16	0.00111	550.33	0.05000	376.04
10046	0.01000	1385.99	0.01000	1385.99	1.01392	1193.46	0.00438	550.33	0.06373	545.53
10047	0.01000	1735.76	0.01000	1735.76	1.12648	1561.73	0.03820	550.33	0.08325	501.84
10048	0.01000	1888.74	0.01000	1888.74	1.17677	1722.86	0.05333	550.33	0.09196	478.82
10049	0.01000	2000.09	0.01000	2000.09	1.21447	1840.19	0.06465	550.33	0.09844	458.19
10050	0.01000	2036.22	0.01000	2036.22	1.23979	1881.30	0.07221	550.33	0.10273	439.89
10051	0.01000	2036.22	0.01000	2036.22	1.25286	1881.30	0.07606	550.33	0.10483	423.86
10052	0.01000	2036.22	0.01000	2036.22	1.25368	1881.30	0.07624	550.33	0.10458	409.89
10053	0.01000	2036.21	0.01000	2036.21	1.24194	1878.85	0.07267	550.33	0.10185	398.07
10054	0.01000	1959.12	0.01000	1959.12	1.22229	1797.86	0.06678	550.33	0.09759	389.83
10055	0.01000	1874.80	0.01000	1874.80	1.19980	1709.23	0.06008	550.33	0.09278	384.28
10056	0.01000	1770.61	0.01000	1770.61	1.17136	1599.70	0.05163	550.33	0.08672	379.72
10057	0.01000	1646.46	0.01000	1646.46	1.13695	1469.15	0.04144	550.33	0.07938	376.14
10058	0.01000	1502.22	0.01000	1502.22	1.09652	1317.46	0.02950	550.33	0.07075	373.56
10059	0.01000	1337.79	0.01000	1337.79	1.05005	1144.52	0.01581	550.33	0.06078	371.96
10060	0.01000	1161.80	0.01000	1161.80	1.00000	959.41	0.00111	550.33	0.05000	371.34

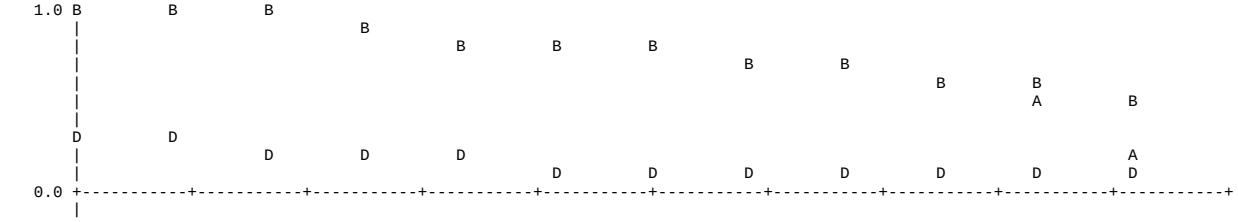
10061	0.01000	1372.64	0.01000	1372.64	1.00835	1180.25	0.00401	550.33	0.06734	544.66
10062	0.01000	1727.30	0.01000	1727.30	1.12209	1553.71	0.03640	550.33	0.09093	502.53
10063	0.01000	1882.51	0.01000	1882.51	1.17302	1717.21	0.05090	550.33	0.10135	480.12
10064	0.01000	1995.39	0.01000	1995.39	1.21124	1836.16	0.06175	550.33	0.10899	459.87
10065	0.01000	2036.22	0.01000	2036.22	1.23693	1881.30	0.06900	550.33	0.11390	441.71
10066	0.01000	2036.22	0.01000	2036.22	1.25025	1881.30	0.07268	550.33	0.11609	425.61
10067	0.01000	2036.22	0.01000	2036.22	1.25124	1881.30	0.07285	550.33	0.11545	411.34
10068	0.01000	2031.16	0.01000	2031.16	1.23964	1874.39	0.06942	550.33	0.11187	399.04
10069	0.01000	1953.29	0.01000	1953.29	1.22012	1792.56	0.06377	550.33	0.10655	390.25
10070	0.01000	1868.37	0.01000	1868.37	1.19779	1703.27	0.05736	550.33	0.10067	384.16
10071	0.01000	1763.69	0.01000	1763.69	1.16957	1593.19	0.04928	550.33	0.09336	378.98
10072	0.01000	1639.21	0.01000	1639.21	1.13545	1462.26	0.03955	550.33	0.08459	374.71
10073	0.01000	1494.91	0.01000	1494.91	1.09543	1310.47	0.02816	550.33	0.07435	371.35
10074	0.01000	1330.72	0.01000	1330.72	1.04949	1137.74	0.01512	550.33	0.06262	368.89
10075	0.01000	1155.04	0.01000	1155.04	1.00000	952.91	0.00110	550.33	0.05000	367.40
10076	0.01000	1361.46	0.01000	1361.46	1.00371	1169.41	0.00366	550.33	0.07046	543.85
10077	0.01000	1711.74	0.01000	1711.74	1.11592	1538.29	0.03450	550.33	0.09681	502.60
10078	0.01000	1865.03	0.01000	1865.03	1.16624	1699.77	0.04831	550.33	0.10838	480.53
10079	0.01000	1976.32	0.01000	1976.32	1.20403	1817.04	0.05864	550.33	0.11677	460.46
10080	0.01000	2036.22	0.01000	2036.22	1.22945	1881.30	0.06554	550.33	0.12204	442.34
10081	0.01000	2036.22	0.01000	2036.22	1.24266	1881.30	0.06904	550.33	0.12421	426.14
10082	0.01000	2036.22	0.01000	2036.22	1.24375	1881.30	0.06918	550.33	0.12321	411.61
10083	0.01000	2009.34	0.01000	2009.34	1.23247	1852.29	0.06591	550.33	0.11896	398.96
10084	0.01000	1932.15	0.01000	1932.15	1.21346	1771.14	0.06052	550.33	0.11283	389.80
10085	0.01000	1848.32	0.01000	1848.32	1.19173	1682.97	0.05442	550.33	0.10616	383.36
10086	0.01000	1745.27	0.01000	1745.27	1.16430	1574.56	0.04675	550.33	0.09794	377.78
10087	0.01000	1623.06	0.01000	1623.06	1.13118	1445.98	0.03752	550.33	0.08816	373.07
10088	0.01000	1481.69	0.01000	1481.69	1.09239	1297.23	0.02673	550.33	0.07681	369.22
10089	0.01000	1321.18	0.01000	1321.18	1.04791	1128.33	0.01438	550.33	0.06388	366.25
10090	0.01000	1149.49	0.01000	1149.49	1.00000	947.66	0.00110	550.33	0.05000	364.21
10091	0.01000	1352.44	0.01000	1352.44	1.00000	1160.94	0.00333	550.33	0.07310	543.09
10092	0.01000	1689.07	0.01000	1689.07	1.10794	1515.45	0.03248	550.33	0.10091	502.06
10093	0.01000	1836.27	0.01000	1836.27	1.15642	1670.51	0.04554	550.33	0.11304	480.04
10094	0.01000	1942.86	0.01000	1942.86	1.19284	1782.82	0.05531	550.33	0.12176	459.95
10095	0.01000	2009.37	0.01000	2009.37	1.21735	1852.94	0.06183	550.33	0.12713	441.76
10096	0.01000	2036.22	0.01000	2036.22	1.23010	1881.30	0.06513	550.33	0.12918	425.43
10097	0.01000	2023.52	0.01000	2023.52	1.23120	1868.01	0.06525	550.33	0.12786	410.71
10098	0.01000	1970.77	0.01000	1970.77	1.22045	1812.56	0.06214	550.33	0.12310	397.85
10099	0.01000	1895.75	0.01000	1895.75	1.20233	1733.64	0.05704	550.33	0.11643	388.48
10100	0.01000	1814.70	0.01000	1814.70	1.18164	1648.36	0.05127	550.33	0.10926	381.87
10101	0.01000	1715.42	0.01000	1715.42	1.15557	1543.89	0.04404	550.33	0.10049	376.12
10102	0.01000	1598.02	0.01000	1598.02	1.12415	1420.33	0.03534	550.33	0.09011	371.22
10103	0.01000	1462.59	0.01000	1462.59	1.08739	1277.78	0.02518	550.33	0.07813	367.19
10104	0.01000	1309.19	0.01000	1309.19	1.04533	1116.32	0.01358	550.33	0.06455	364.01
10105	0.01000	1145.17	0.01000	1145.17	1.00000	943.66	0.00109	550.33	0.05000	361.78
10106	0.01000	1345.59	0.01000	1345.59	0.99721	1154.83	0.00303	550.33	0.07527	542.39
10107	0.01000	1658.41	0.01000	1658.41	1.09788	1484.28	0.03028	550.33	0.10316	501.01
10108	0.01000	1795.38	0.01000	1795.38	1.14328	1628.55	0.04253	550.33	0.11529	478.76
10109	0.01000	1894.24	0.01000	1894.24	1.17741	1732.70	0.05170	550.33	0.12394	458.47
10110	0.01000	1955.44	0.01000	1955.44	1.20040	1797.19	0.05781	550.33	0.12917	440.09
10111	0.01000	1979.37	0.01000	1979.37	1.21237	1822.43	0.06091	550.33	0.13101	423.60
10112	0.01000	1966.34	0.01000	1966.34	1.21352	1808.76	0.06104	550.33	0.12943	408.76
10113	0.01000	1915.93	0.01000	1915.93	1.20365	1755.72	0.05814	550.33	0.12438	395.81
10114	0.01000	1844.99	0.01000	1844.99	1.18692	1681.04	0.05338	550.33	0.11747	386.41
10115	0.01000	1768.65	0.01000	1768.65	1.16781	1600.67	0.04799	550.33	0.11010	379.80
10116	0.01000	1675.40	0.01000	1675.40	1.14372	1502.50	0.04123	550.33	0.10113	374.07
10117	0.01000	1565.35	0.01000	1565.35	1.11467	1386.63	0.03310	550.33	0.09057	369.22
10118	0.01000	1438.59	0.01000	1438.59	1.08071	1253.15	0.02361	550.33	0.07841	365.27
10119	0.01000	1295.20	0.01000	1295.20	1.04186	1102.17	0.01276	550.33	0.06467	362.20
10120	0.01000	1145.17	0.01000	1142.07	1.00000	940.91	0.00108	550.33	0.05000	361.78
10121	0.01000	1340.90	0.01000	1340.90	0.99536	1151.10	0.00275	550.33	0.07695	541.74
10122	0.01000	1620.66	0.01000	1620.66	1.08602	1445.71	0.02798	550.33	0.10360	499.35
10123	0.01000	1743.05	0.01000	1743.05	1.12704	1574.61	0.03934	550.33	0.11514	476.59
10124	0.01000	1830.98	0.01000	1830.98	1.15791	1667.21	0.04785	550.33	0.12331	455.90
10125	0.01000	1884.77	0.01000	1884.77	1.17873	1723.86	0.05354	550.33	0.12813	437.22
10126	0.01000	1904.75	0.01000	1904.75	1.18960	1744.90	0.05643	550.33	0.12965	420.53
10127	0.01000	1891.36	0.01000	1891.36	1.19073	1730.78	0.05656	550.33	0.12786	405.63
10128	0.01000	1844.25	0.01000	1844.25	1.18196	1681.15	0.05388	550.33	0.12272	392.74
10129	0.01000	1778.92	0.01000	1778.92	1.16702	1612.32	0.04949	550.33	0.11583	383.48
10130	0.01000	1709.04	0.01000	1709.04	1.14994	1538.71	0.04450	550.33	0.10856	377.05
10131	0.01000	1623.99	0.01000	1623.99	1.12840	1449.11	0.03825	550.33	0.09975	371.57
10132	0.01000	1523.86	0.01000	1523.86	1.10245	1343.62	0.03072	550.33	0.08942	367.03
10133	0.01000	1408.77	0.01000	1408.77	1.07210	1222.37	0.02193	550.33	0.07758	363.44
10134	0.01000	1278.81	0.01000	1278.81	1.03739	1085.45	0.01189	550.33	0.06423	361.78
10135	0.01000	1145.17	0.01000	1140.18	1.00000	939.41	0.00107	550.33	0.05000	361.78
10136	0.01000	1338.37	0.01000	1338.37	0.99443	1149.74	0.00250	550.33	0.07815	541.15
10137	0.01000	1575.80	0.01000	1575.80	1.07236	1399.74	0.02556	550.33	0.10224	497.09
10138	0.01000	1679.37	0.01000	1679.37	1.10774	1508.78	0.03598	550.33	0.11261	473.54
10139	0.01000	1753.17	0.01000	1753.17	1.13439	1586.46	0.04379	550.33	0.11986	452.24
10140	0.01000	1797.43	0.01000	1797.43	1.15238	1633.02	0.04901	550.33	0.12402	433.15
10141	0.01000	1812.38	0.01000	1812.38	1.16178	1648.70	0.05167	550.33	0.12511	416.24
10142	0.01000	1798.58	0.01000	1798.58	1.16282	1634.09	0.05180	550.33	0.12315	401.33
10143	0.01000	1755.71	0.01000	1755.71	1.15536	1588.84	0.04937	550.33	0.11811	388.64
10144	0.01000	1697.55	0.01000	1697.55	1.14262	1527.50	0.04535	550.33	0.11153	379.71
10145	0.01000	1635.88	0.01000	1635.88	1.12803	1462.46	0.04080	550.33	0.10464	373.65
10146	0.01000	1561.19	0.01000	1561.19	1.10963	1383.71	0.03508	550.33	0.09635	368.62
10147	0.01000	1473.58	0.01000	1473.58	1.08746	1291.34	0.02819	550.33	0.08668	364.64
10148	0.01000	1373.15	0.01000	1373.15	1.06155	1185.46	0.02015	550.33	0.07563	361.78
10149	0.01000	1259.99	0.01000	1259.99	1.03191	1066.16	0.01096	550.33	0.06321	361.78
10150	0.01000	1145.17	0.01000	1139.52	1.00000	939.16	0.00106	550.33	0.05000	361.78
10151	0.01000	1338.02	0.01000	1338.02	0.99443	1150.76	0.00228	550.33	0.07887	540.61
10152	0.01000	1523.90	0.01000	1523.90	1.05692	1346.42	0.02304	550.33	0.09908	494.24
10153	0.01000	1604.38	0.01000	1604.38	1.08539	1431.11	0.03245	550.33	0.10770	469.61
10154	0.01000	1660.86	0.01000	1660.86	1.10686	1490.49	0.03951	550.33	0.11361	447.50
10155	0.01000	1693.43	0.01000	1693.43	1.12135	1524.68	0.04423	550.33	0.11683	427.88

10156	0.01000	1702.26	0.01000	1702.26	1.12891	1533.85	0.04664	550.33	0.11738	410.71
10157	0.01000	1688.00	0.01000	1688.00	1.12980	1518.67	0.04678	550.33	0.11530	395.86
10158	0.01000	1650.34	0.01000	1650.34	1.12388	1478.82	0.04459	550.33	0.11056	383.50
10159	0.01000	1600.90	0.01000	1600.90	1.11372	1426.58	0.04098	550.33	0.10455	375.08
10160	0.01000	1549.17	0.01000	1549.17	1.10208	1371.95	0.03688	550.33	0.09834	369.57
10161	0.01000	1487.01	0.01000	1487.01	1.08741	1306.31	0.03173	550.33	0.09094	365.23
10162	0.01000	1414.49	0.01000	1414.49	1.06973	1229.77	0.02552	550.33	0.08234	362.07
10163	0.01000	1331.72	0.01000	1331.72	1.04906	1142.40	0.01827	550.33	0.07256	361.78
10164	0.01000	1238.77	0.01000	1238.77	1.02543	1044.31	0.00998	550.33	0.06161	361.78
10165	0.01000	1145.17	0.01000	1140.08	1.00000	940.16	0.00105	550.33	0.05000	361.78
10166	0.01000	1339.83	0.01000	1339.83	0.99536	1154.15	0.00208	550.33	0.07911	540.13
10167	0.01000	1465.03	0.01000	1465.03	1.03972	1285.84	0.02041	550.33	0.09414	490.80
10168	0.01000	1518.16	0.01000	1518.16	1.06001	1341.66	0.02874	550.33	0.10041	464.80
10169	0.01000	1554.07	0.01000	1554.07	1.07531	1379.32	0.03500	550.33	0.10455	441.68
10170	0.01000	1572.78	0.01000	1572.78	1.08563	1398.85	0.03920	550.33	0.10657	421.41
10171	0.01000	1574.38	0.01000	1574.38	1.09099	1400.32	0.04134	550.33	0.10647	403.95
10172	0.01000	1559.62	0.01000	1559.62	1.09166	1384.53	0.04148	550.33	0.10431	389.21
10173	0.01000	1528.12	0.01000	1528.12	1.08749	1351.07	0.03956	550.33	0.10006	377.34
10174	0.01000	1488.95	0.01000	1488.95	1.08032	1309.56	0.03637	550.33	0.09490	369.60
10175	0.01000	1448.91	0.01000	1448.91	1.07210	1267.17	0.03275	550.33	0.08967	364.83
10176	0.01000	1401.44	0.01000	1401.44	1.06173	1216.93	0.02820	550.33	0.08350	361.78
10177	0.01000	1346.61	0.01000	1346.61	1.04924	1158.92	0.02271	550.33	0.07641	361.78
10178	0.01000	1284.50	0.01000	1284.50	1.03464	1093.22	0.01629	550.33	0.06838	361.78
10179	0.01000	1215.15	0.01000	1215.15	1.01796	1019.90	0.00895	550.33	0.05944	361.78
10180	0.01000	1145.17	0.01000	1141.86	1.00000	942.41	0.00103	550.33	0.05000	361.78
10181	0.01000	1343.82	0.01000	1343.82	0.99721	1159.91	0.00190	550.33	0.07887	539.70
10182	0.01000	1399.30	0.01000	1399.30	1.02079	1218.11	0.01767	550.33	0.08742	486.78
10183	0.01000	1420.76	0.01000	1420.76	1.03162	1240.52	0.02487	550.33	0.09076	459.12
10184	0.01000	1432.85	0.01000	1432.85	1.03978	1253.02	0.03028	550.33	0.09270	434.78
10185	0.01000	1435.53	0.01000	1435.53	1.04525	1255.58	0.03391	550.33	0.09324	413.74
10186	0.01000	1428.74	0.01000	1428.74	1.04802	1248.14	0.03578	550.33	0.09236	395.96
10187	0.01000	1413.45	0.01000	1413.45	1.04841	1231.68	0.03591	550.33	0.09018	381.40
10188	0.01000	1389.06	0.01000	1389.06	1.04622	1205.60	0.03427	550.33	0.08661	370.15
10189	0.01000	1361.73	0.01000	1361.73	1.04243	1176.46	0.03153	550.33	0.08258	363.27
10190	0.01000	1335.11	0.01000	1335.11	1.03808	1148.12	0.02841	550.33	0.07862	361.78
10191	0.01000	1304.51	0.01000	1304.51	1.03260	1115.55	0.02448	550.33	0.07405	361.78
10192	0.01000	1269.94	0.01000	1269.94	1.02600	1078.80	0.01975	550.33	0.06887	361.78
10193	0.01000	1231.47	0.01000	1231.47	1.01829	1037.91	0.01421	550.33	0.06309	361.78
10194	0.01000	1189.12	0.01000	1189.12	1.00948	992.92	0.00786	550.33	0.05670	361.78
10195	0.01000	1145.17	0.01000	1144.86	1.00000	945.91	0.00102	550.33	0.05000	363.09
10196	0.01000	1349.97	0.01000	1349.97	1.00000	1168.05	0.00175	550.33	0.07814	539.33
10197	0.01000	1326.81	0.01000	1326.81	1.00016	1143.33	0.01483	550.33	0.07894	482.20
10198	0.01000	1312.30	0.01000	1312.30	1.00025	1127.79	0.02083	550.33	0.07876	452.57
10199	0.01000	1297.27	0.01000	1297.27	1.00027	1111.65	0.02534	550.33	0.07806	426.80
10200	0.01000	1281.66	0.01000	1281.66	1.00019	1094.86	0.02838	550.33	0.07684	404.87
10201	0.01000	1265.35	0.01000	1265.35	1.00000	1077.28	0.02994	550.33	0.07508	386.74
10202	0.01000	1249.47	0.01000	1249.47	1.00004	1060.10	0.03007	550.33	0.07291	372.41
10203	0.01000	1233.16	0.01000	1233.16	1.00004	1042.41	0.02872	550.33	0.07022	361.93
10204	0.01000	1219.21	0.01000	1219.21	1.00004	1027.26	0.02645	550.33	0.06759	361.78
10205	0.01000	1207.78	0.01000	1207.78	1.00003	1014.81	0.02386	550.33	0.06520	361.78
10206	0.01000	1196.20	0.01000	1196.20	1.00002	1002.19	0.02059	550.33	0.06258	361.78
10207	0.01000	1184.49	0.01000	1184.49	1.00001	989.42	0.01664	550.33	0.05974	361.78
10208	0.01000	1172.65	0.01000	1172.65	1.00000	976.47	0.01202	550.33	0.05667	361.78
10209	0.01000	1160.68	0.01000	1160.68	1.00000	963.38	0.00672	550.33	0.05338	361.78
10210	0.01000	1149.08	0.01000	1149.08	1.00000	950.66	0.00100	550.33	0.05000	365.96
10422	0.01000	1320.17	0.01000	1320.17	1.00000	1136.24	0.01746	550.33	0.07884	469.46
10423	0.01000	1310.68	0.01000	1310.68	1.00000	1126.08	0.02106	550.33	0.07864	451.13
10424	0.01000	1296.61	0.01000	1296.61	1.00000	1110.98	0.02524	550.33	0.07797	427.16
10425	0.01000	1265.35	0.01000	1265.35	1.00000	1077.28	0.02994	550.33	0.07508	386.74
10426	0.01000	1264.08	0.01000	1264.08	1.00000	1075.91	0.03000	550.33	0.07492	385.46
10427	0.01000	1248.40	0.01000	1248.40	1.00000	1058.95	0.03003	550.33	0.07275	371.70
10428	0.01000	1224.41	0.01000	1224.41	1.00000	1032.91	0.02743	550.33	0.06862	361.78
10429	0.01000	1215.44	0.01000	1215.44	1.00000	1023.16	0.02569	550.33	0.06683	361.78
10430	0.01000	1207.67	0.01000	1207.67	1.00000	1014.70	0.02385	550.33	0.06519	361.78
10431	0.01000	1196.12	0.01000	1196.12	1.00000	1002.11	0.02058	550.33	0.06257	361.78
10432	0.01000	1184.44	0.01000	1184.44	1.00000	989.36	0.01664	550.33	0.05973	361.78
10433	0.01000	1172.62	0.01000	1172.62	1.00000	976.44	0.01201	550.33	0.05667	361.78
10434	0.01000	1160.67	0.01000	1160.67	1.00000	963.37	0.00672	550.33	0.05337	361.78

OPTIMIZATION SYSTEM FOR TPSSYM = 4

TOTAL NUMBER OF DESIGN VARIABLES = 36
TOTAL NUMBER OF CONSTRAINS = 636
TOTAL NUMBER OF TEMP. CONSTRAINS = 468
TOTAL NUMBER OF TEMP. PRINTOUTS = 13

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



MAXIMUM TEMPERATURE OF EVERY LAYER

LAYER:	1	2	3	4
Tmax:	2300.33	2300.33	550.33	600.33
Optv:	1795.44	1795.44	549.97	549.97

VALUES OF DESIGN VARIABLES :

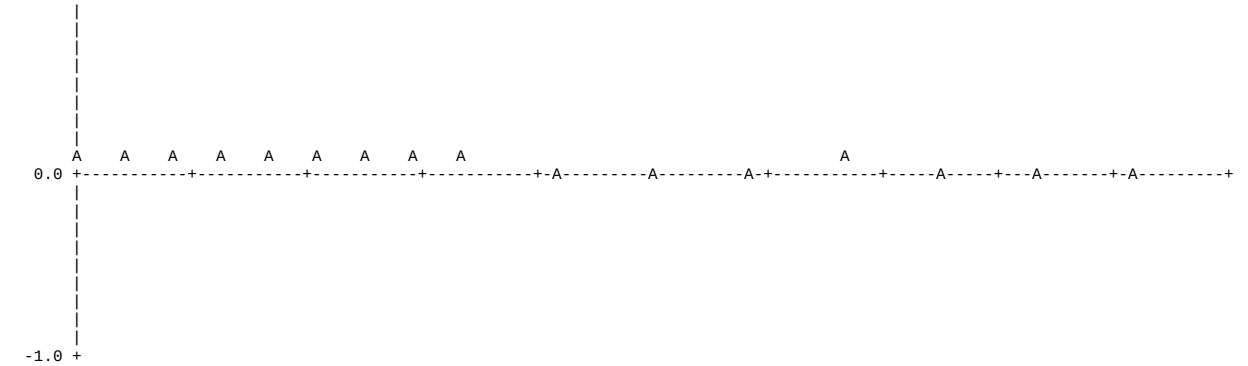
LAYER	DEV01	DEV02	DEV03	DEV04	DEV05	DEV06	DEV07	DEV08	DEV09
1	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000
2	2.16049	2.27166	2.35272	2.11795	2.40248	2.24113	1.91584	1.99332	2.04564
3	0.02362	0.01719	0.01761	0.02425	0.00103	0.02301	0.02365	0.02088	0.02266
4	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000

THE ORIGINAL OBJECTIVE FUNCTION = 89.0599976

THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.6475893

THE TOTAL OPTIMAL WEIGHT = 4.91543861E+04

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



OPTIMAL STRUCTURES OF TPS FOR PATCH = 4
(WITH AVERAGE THICKNESS)

HRSI COAT	thin skin	0.01000 in.	1795.4 F
LI-900 (P)	slab	2.16680 in.	1795.4 F
RTV-560	thin skin	0.01932 in.	550.0 F
17 LB SIP .16 IN	slab	0.05000 in.	550.0 F

THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH = 4

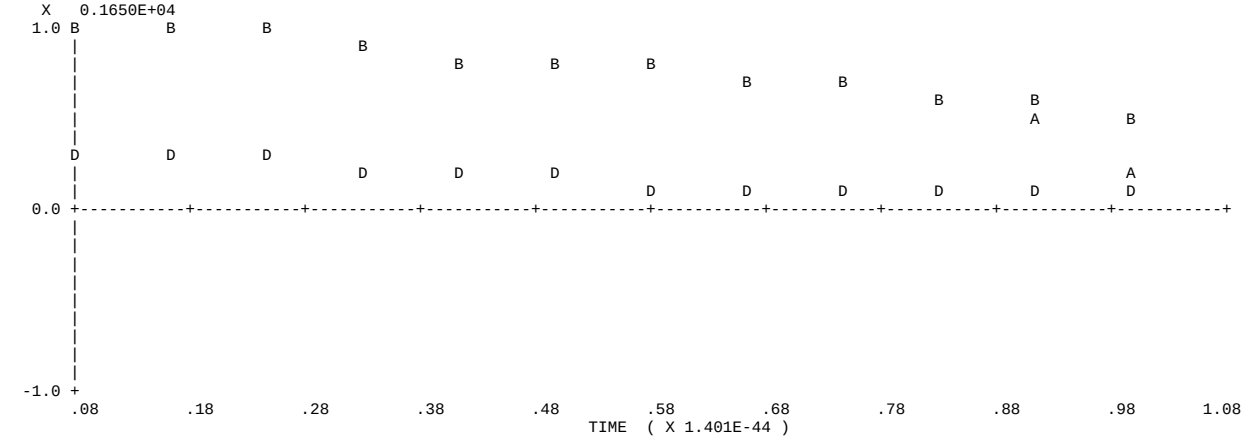
PANEL	LAYER01		LAYER02		LAYER03		LAYER04	
366	0.01000	1667.01	2.09657	1667.01	0.02326	550.33	0.05000	548.83
367	0.01000	1633.98	2.14317	1633.98	0.01533	550.33	0.05000	548.78
368	0.01000	1605.26	2.13971	1605.26	0.01273	550.33	0.05000	548.08
369	0.01000	1580.84	2.08461	1580.84	0.01559	550.33	0.05000	546.70
370	0.01000	1560.96	1.97802	1560.96	0.02392	550.33	0.05000	544.66
378	0.01000	1632.28	2.04564	1632.28	0.02266	550.33	0.05000	548.83
379	0.01000	1600.21	2.02264	1600.21	0.02120	550.33	0.05000	547.95
380	0.01000	1571.45	1.99332	1571.45	0.02088	550.33	0.05000	546.93
381	0.01000	1546.03	1.95774	1546.03	0.02170	550.33	0.05000	545.78
382	0.01000	1523.92	1.91584	1523.92	0.02365	550.33	0.05000	544.49
414	0.01000	1795.44	2.35272	1795.44	0.01761	550.33	0.05000	549.89
415	0.01000	1751.94	2.31607	1751.94	0.01653	550.33	0.05000	549.10
416	0.01000	1716.49	2.27166	1716.49	0.01719	550.33	0.05000	548.37
417	0.01000	1689.11	2.21996	1689.11	0.01953	550.33	0.05000	547.71
418	0.01000	1669.77	2.16049	1669.77	0.02362	550.33	0.05000	547.11
426	0.01000	1783.01	2.30353	1783.01	0.02097	550.33	0.05000	549.42

427	0.01000	1742.12	2.39223	1742.12	0.00851	550.33	0.05000	549.97
428	0.01000	1709.01	2.39744	1709.01	0.00483	550.33	0.05000	549.70
429	0.01000	1683.60	2.31798	1683.60	0.01003	550.33	0.05000	548.42
430	0.01000	1665.99	2.15421	1665.99	0.02409	550.33	0.05000	546.20
438	0.01000	1755.50	2.24113	1755.50	0.02301	550.33	0.05000	549.09
439	0.01000	1717.41	2.37755	1717.41	0.00636	550.33	0.05000	549.97
440	0.01000	1686.20	2.40248	1686.20	0.00103	550.33	0.05000	549.97
441	0.01000	1661.82	2.31589	1661.82	0.00699	550.33	0.05000	548.41
442	0.01000	1644.35	2.11795	1644.35	0.02425	550.33	0.05000	545.52
450	0.01000	1711.92	2.16670	1711.92	0.02354	550.33	0.05000	548.90
451	0.01000	1677.10	2.28116	1677.10	0.00922	550.33	0.05000	549.69
452	0.01000	1647.77	2.30090	1647.77	0.00451	550.33	0.05000	549.30
453	0.01000	1623.95	2.22447	1623.95	0.00954	550.33	0.05000	547.73
454	0.01000	1605.90	2.05344	1605.90	0.02417	550.33	0.05000	545.00

OPTIMIZATION SYSTEM FOR TPSSYM = 5

TOTAL NUMBER OF DESIGN VARIABLES = 36
TOTAL NUMBER OF CONSTRAINS = 636
TOTAL NUMBER OF TEMP. CONSTRAINS = 468
TOTAL NUMBER OF TEMP. PRINTOUTS = 13

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



MAXIMUM TEMPERATURE OF EVERY LAYER

LAYER:	1	2	3	4
Tmax:	2300.33	2300.33	550.33	600.33
Optv:	1650.15	1650.15	549.88	549.88

VALUES OF DESIGN VARIABLES :

LAYER	DEV01	DEV02	DEV03	DEV04	DEV05	DEV06	DEV07	DEV08	DEV09
1	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000
2	2.05560	2.09683	2.13030	2.01462	2.06486	2.14598	1.63378	1.79870	1.84334
3	0.02436	0.02404	0.02433	0.02606	0.02433	0.01920	0.03813	0.02569	0.02667
4	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000

THE ORIGINAL OBJECTIVE FUNCTION = 89.0599976

THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.6166089

THE TOTAL OPTIMAL WEIGHT = 5.35626799E+04

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES

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      .08         .18         .28         .38         .48         .58         .68         .78         .88         .98       1.08
                                                                 TIME  ( X 1.401E-44 )

              OPTIMAL STRUCTURES OF TPS FOR PATCH =       5
                    (WITH AVERAGE THICKNESS)
 ============================================================   -----
                      HRSI COAT           thin skin            0.01000 in.  1650.2 F
 ============================================================   -----
                                                                 i
                      LI-900 (P)          slab                 1.97600 in.  1650.2 F
                                                                 i
 ============================================================   -----
                      RTV-560             thin skin            0.02587 in.   549.9 F
 ============================================================   -----
                                                                 i
                      17 LB SIP .16 IN    slab                 0.05000 in.   549.9 F
                                                                 i
 ============================================================   -----


         THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =       5

   PANEL   LAYER01            LAYER02            LAYER03            LAYER04
     371   0.01000   1538.22  1.94562   1538.22  0.02362   550.33   0.05000   549.83
     372   0.01000   1517.72  1.92325   1517.72  0.02352   550.33   0.05000   549.82
     373   0.01000   1499.26  1.88427   1499.26  0.02529   550.33   0.05000   549.70
     374   0.01000   1482.79  1.82889   1482.79  0.02890   550.33   0.05000   549.48
     375   0.01000   1468.52  1.75847   1468.52  0.03423   550.33   0.05000   549.17
     383   0.01000   1497.87  1.84334   1497.87  0.02667   550.33   0.05000   549.82
     384   0.01000   1474.28  1.83607   1474.28  0.02450   550.33   0.05000   549.88
     385   0.01000   1453.74  1.79870   1453.74  0.02569   550.33   0.05000   549.79
     386   0.01000   1436.25  1.73129   1436.25  0.03023   550.33   0.05000   549.44
     387   0.01000   1421.80  1.63378   1421.80  0.03813   550.33   0.05000   548.87
     419   0.01000   1650.15  2.13030   1650.15  0.02433   550.33   0.05000   549.74
     420   0.01000   1631.46  2.11458   1631.46  0.02411   550.33   0.05000   549.85
     421   0.01000   1613.35  2.09683   1613.35  0.02404   550.33   0.05000   549.88
     422   0.01000   1595.86  2.07721   1595.86  0.02413   550.33   0.05000   549.82
     423   0.01000   1578.94  2.05560   1578.94  0.02436   550.33   0.05000   549.67
     431   0.01000   1648.82  2.17142   1648.82  0.02029   550.33   0.05000   549.80
     432   0.01000   1632.58  2.13349   1632.58  0.02265   550.33   0.05000   549.72
     433   0.01000   1616.40  2.10371   1616.40  0.02409   550.33   0.05000   549.70
     434   0.01000   1600.22  2.08202   1600.22  0.02460   550.33   0.05000   549.73
     435   0.01000   1584.13  2.06840   1584.13  0.02421   550.33   0.05000   549.80
     443   0.01000   1627.25  2.14598   1627.25  0.01920   550.33   0.05000   549.83
     444   0.01000   1611.21  2.10159   1611.21  0.02219   550.33   0.05000   549.69
     445   0.01000   1595.39  2.06486   1595.39  0.02433   550.33   0.05000   549.62
     446   0.01000   1579.71  2.03579   1579.71  0.02563   550.33   0.05000   549.64
     447   0.01000   1564.26  2.01462   1564.26  0.02606   550.33   0.05000   549.74
     455   0.01000   1586.59  2.06106   1586.59  0.02062   550.33   0.05000   549.84
     456   0.01000   1568.89  2.02332   1568.89  0.02259   550.33   0.05000   549.73
     457   0.01000   1552.07  1.98362   1552.07  0.02479   550.33   0.05000   549.63
     458   0.01000   1536.09  1.94200   1536.09  0.02720   550.33   0.05000   549.56
     459   0.01000   1521.21  1.89928   1521.21  0.02978   550.33   0.05000   549.50


                   OPTIMIZATION SYSTEM FOR TPSSYM =     6


 TOTAL NUMBER OF DESIGN VARIABLES =   36
 TOTAL NUMBER OF CONSTRAINS       =  636
 TOTAL NUMBER OF TEMP. CONSTRAINS =  468
 TOTAL NUMBER OF TEMP. PRINTOUTS  =   13


MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
    X   0.1556E+04
   1.0 B         B         B
       |                             B
       |                                       B         B         B
       |                                                             B         B
       |                                                                       B         B
       |                                                                                 A         B
       D
       |         D         D                                                                       A
       |                             D         D         D
       |                                                   D         D         D         D         D         D         D
   0.0 +-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+
       |
       |
       |
       |
       |
       |
       |
       |
       |
       |
  -1.0 +
       .08         .18         .28         .38         .48         .58         .68         .78         .88         .98       1.08
                                                                 TIME  ( X 1.401E-44 )


              MAXIMUM TEMPERATURE OF EVERY LAYER
LAYER:        1         2         3         4
Tmax:    2300.33   2300.33    550.33    600.33
Optv:    1556.36   1556.36    547.20    547.20
```

VALUES OF DESIGN VARIABLES :

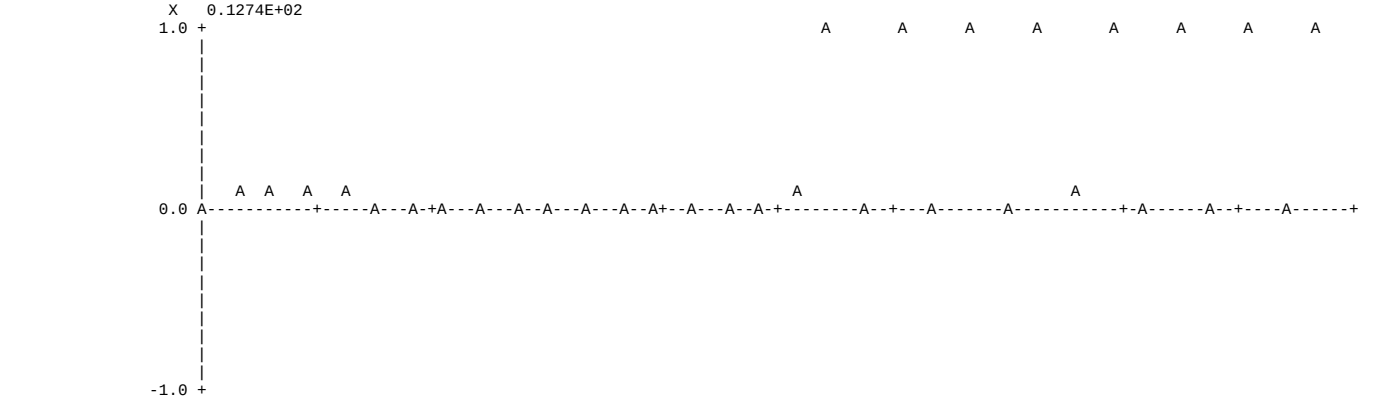
LAYER	DEV01	DEV02	DEV03	DEV04	DEV05	DEV06	DEV07	DEV08	DEV09
1	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000
2	1.82148	1.81220	1.99811	1.92879	1.81392	1.99431	1.52682	1.66251	1.65857
3	0.02778	0.03389	0.02671	0.01594	0.03543	0.02550	0.03120	0.02485	0.03280
4	0.05000	0.05000	0.05000	0.07482	0.08000	0.06504	0.05000	0.05000	0.05000

THE ORIGINAL OBJECTIVE FUNCTION = 89.0600052

THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.5853232

THE TOTAL OPTIMAL WEIGHT = 5.74007395E+04

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



OPTIMAL STRUCTURES OF TPS FOR PATCH = 6
(WITH AVERAGE THICKNESS)

HRSI COAT	thin skin	0.01000 in.	1556.4 F
LI-900 (P)	slab	1.80186 in.	1556.4 F
RTV-560	thin skin	0.02823 in.	547.2 F
17 LB SIP .16 IN	slab	0.05776 in.	547.2 F

THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH = 6

PANEL	LAYER01		LAYER02		LAYER03		LAYER04	
376	0.01000	1446.89	1.77201	1446.89	0.03018	550.33	0.05691	539.85
388	0.01000	1399.64	1.65857	1399.64	0.03280	550.33	0.05000	544.90
424	0.01000	1556.36	1.99811	1556.36	0.02671	550.33	0.05000	547.20
436	0.01000	1556.36	2.02891	1556.36	0.02526	550.33	0.06083	538.29
448	0.01000	1543.75	1.99431	1543.75	0.02550	550.33	0.06504	534.50
460	0.01000	1499.97	1.89582	1499.97	0.02751	550.33	0.06312	535.47
511	0.01000	1372.95	1.67818	1372.95	0.02707	550.33	0.05005	544.15
512	0.01000	1419.21	1.74101	1419.21	0.02972	550.33	0.06152	536.57
515	0.01000	1348.55	1.66251	1348.55	0.02485	550.33	0.05000	543.85
516	0.01000	1394.85	1.71424	1394.85	0.02864	550.33	0.06379	536.42
519	0.01000	1327.20	1.61217	1327.20	0.02623	550.33	0.05000	543.90
520	0.01000	1374.17	1.69260	1374.17	0.02691	550.33	0.06368	539.42
523	0.01000	1308.69	1.52682	1308.69	0.03120	550.33	0.05000	544.34
524	0.01000	1357.80	1.67669	1357.80	0.02461	550.33	0.06135	545.38
1937	0.01000	1411.19	1.83195	1411.19	0.01843	550.33	0.07161	546.39
1938	0.01000	1425.76	1.77882	1425.76	0.02792	550.33	0.07608	535.40
1939	0.01000	1445.57	1.77144	1445.57	0.03267	550.33	0.07619	529.83
1940	0.01000	1470.30	1.81091	1470.30	0.03247	550.33	0.07182	529.88
1941	0.01000	1449.78	1.92879	1449.78	0.01594	550.33	0.07482	546.89
1942	0.01000	1462.58	1.83428	1462.58	0.02937	550.33	0.07994	534.24
1943	0.01000	1482.60	1.81392	1482.60	0.03543	550.33	0.08000	527.97
1944	0.01000	1509.72	1.86758	1509.72	0.03411	550.33	0.07502	528.07
1945	0.01000	1460.90	1.92752	1460.90	0.01896	550.33	0.06778	546.58
1946	0.01000	1472.61	1.84031	1472.61	0.03086	550.33	0.07154	537.37
1947	0.01000	1493.53	1.82812	1493.53	0.03588	550.33	0.07157	532.94
1948	0.01000	1523.66	1.89128	1523.66	0.03399	550.33	0.06791	533.31
1949	0.01000	1442.36	1.82148	1442.36	0.02778	550.33	0.05000	545.42
1950	0.01000	1453.89	1.79243	1453.89	0.03250	550.33	0.05003	545.01
1951	0.01000	1476.73	1.81220	1476.73	0.03389	550.33	0.05000	545.19
1952	0.01000	1510.97	1.88101	1510.97	0.03194	550.33	0.05000	545.91

OPTIMIZATION SYSTEM FOR TPSSYM = 7

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TOTAL NUMBER OF DESIGN VARIABLES =   36
 TOTAL NUMBER OF CONSTRAINS       =  596
 TOTAL NUMBER OF TEMP. CONSTRAINS =  468
 TOTAL NUMBER OF TEMP. PRINTOUTS  =   13
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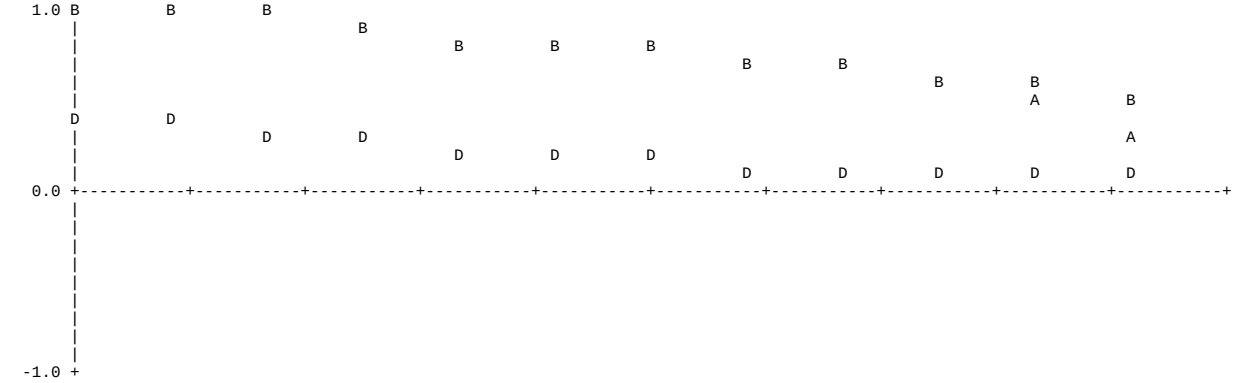
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



MAXIMUM TEMPERATURE OF EVERY LAYER

LAYER:	1	2	3	4
Tmax:	2300.33	2300.33	550.33	600.33
Optv:	1439.59	1439.59	550.16	550.16

VALUES OF DESIGN VARIABLES :

LAYER	DEV01	DEV02	DEV03	DEV04	DEV05	DEV06	DEV07	DEV08	DEV09
1	0.01000	0.01094	0.01000	0.01000	0.01098	0.01000	0.01000	0.01015	0.01000
2	1.82137	1.74461	1.80796	1.70278	1.74113	1.83854	1.34930	1.48626	1.57262
3	0.02748	0.03172	0.02662	0.03306	0.03180	0.02386	0.03731	0.02676	0.02167
4	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000

THE ORIGINAL OBJECTIVE FUNCTION = 74.2167816

THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.5455250

THE TOTAL OPTIMAL WEIGHT = 4.69528964E+04

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES

OPTIMAL STRUCTURES OF TPS FOR PATCH = 7
(WITH AVERAGE THICKNESS)

HRSI COAT	thin skin	0.01023 in.	1439.6 F
LI-900 (P)	slab	1.67384 in.	1439.6 F
RTV-560	thin skin	0.02892 in.	550.2 F
17 LB SIP .16 IN	slab	0.05000 in.	550.2 F

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                                                                i
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         THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =       7

   PANEL   LAYER01            LAYER02            LAYER03            LAYER04
     617   0.01000   1271.30   1.42681   1271.30   0.03676    550.33   0.05000    549.17
    1936   0.01000   1279.49   1.44383   1279.49   0.03662    550.33   0.05000    549.25
     613   0.01000   1233.56   1.34930   1233.56   0.03731    550.33   0.05000    548.79
     614   0.01014   1246.31   1.41236   1246.31   0.03196    550.33   0.05000    549.83
     615   0.01015   1260.71   1.48626   1260.71   0.02676    550.33   0.05000    550.05
     616   0.01000   1277.05   1.57262   1277.05   0.02167    550.33   0.05000    549.38
     618   0.01024   1282.83   1.45804   1282.83   0.03498    550.33   0.05000    549.55
     619   0.01044   1305.33   1.54010   1305.33   0.02979    550.33   0.05000    549.92
     620   0.01006   1328.69   1.65245   1328.69   0.02278    550.33   0.05000    549.73
     621   0.01000   1332.97   1.55730   1332.97   0.03547    550.33   0.05000    549.73
     622   0.01050   1347.46   1.57841   1347.46   0.03517    550.33   0.05000    549.71
     623   0.01080   1370.11   1.64345   1370.11   0.03154    550.33   0.05000    549.74
     624   0.01009   1391.04   1.75595   1391.04   0.02354    550.33   0.05000    549.98
     625   0.01000   1396.57   1.70278   1396.57   0.03306    550.33   0.05000    550.14
     626   0.01098   1411.18   1.69603   1411.18   0.03491    550.33   0.05000    549.64
     627   0.01098   1425.22   1.74114   1425.22   0.03180    550.33   0.05000    549.65
     628   0.01000   1439.59   1.83854   1439.59   0.02386    550.33   0.05000    550.16
     629   0.01000   1425.43   1.78420   1425.43   0.03044    550.33   0.05000    550.09
     630   0.01104   1432.43   1.74418   1432.43   0.03413    550.33   0.05000    549.63
     631   0.01106   1439.59   1.76823   1439.59   0.03233    550.33   0.05000    549.60
     632   0.01000   1439.59   1.85383   1439.59   0.02512    550.33   0.05000    550.04
     633   0.01000   1429.21   1.82137   1429.21   0.02748    550.33   0.05000    549.69
     634   0.01094   1424.26   1.74892   1424.26   0.03199    550.33   0.05000    549.66
     635   0.01094   1427.13   1.74461   1427.13   0.03172    550.33   0.05000    549.65
     636   0.01000   1438.18   1.80796   1438.18   0.02662    550.33   0.05000    549.63

                  OPTIMIZATION SYSTEM FOR TPSSYM =     8


 TOTAL NUMBER OF DESIGN VARIABLES =   36
 TOTAL NUMBER OF CONSTRAINS       =  620
 TOTAL NUMBER OF TEMP. CONSTRAINS =  468
 TOTAL NUMBER OF TEMP. PRINTOUTS  =   13

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
    X   0.1427E+04
   1.0 B         B         B
       |                   B
       |                             B         B         B
       |                                                 B         B
       |                                                           B         B
       |                                                           A         B
       D
       |         D         D         D                                       A
       |                             D         D
       |                                       D         D         D         D         D         D
   0.0 +-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+
       |
       |
       |
       |
       |
       |
       |
       |
       |
  -1.0 +
       .08         .18         .28         .38         .48         .58         .68         .78         .88         .98        1.08
                                                              TIME  ( X 1.401E-44 )


              MAXIMUM TEMPERATURE OF EVERY LAYER
LAYER:        1        2        3        4
Tmax:   2300.33  2300.33   550.33   600.33
Optv:   1426.84  1426.84   550.28   550.28

                  VALUES OF DESIGN VARIABLES :
LAYER    DEV01    DEV02    DEV03    DEV04    DEV05    DEV06    DEV07    DEV08    DEV09
    1  0.01000  0.01000  0.01000  0.01000  0.01000  0.01000  0.01000  0.01000  0.01000
    2  1.60326  1.82617  2.09737  1.68987  1.65716  2.02694  1.58430  1.60155  1.61659
    3  0.03095  0.02214  0.00131  0.02693  0.03667  0.02465  0.02926  0.03257  0.03900
    4  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000

 THE ORIGINAL OBJECTIVE FUNCTION =      83.1222305

 THE RATIO OF OPTIMAL OBJECTIVE FUNCTION =   0.5645866

 THE TOTAL OPTIMAL WEIGHT = 3.75268118E+04


MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
    X   0.1274E+02
   1.0 +                                                A A A A A A A A A A A A A A A A A A  A A A A A A A A A A A A A A A A A
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OPTIMAL STRUCTURES OF TPS FOR PATCH = 8
(WITH AVERAGE THICKNESS)

HRSI COAT	thin skin	0.01000 in.	1426.8 F
LI-900 (P)	slab	1.74480 in.	1426.8 F
RTV-560	thin skin	0.02705 in.	550.3 F
17 LB SIP .16 IN	slab	0.05000 in.	550.3 F

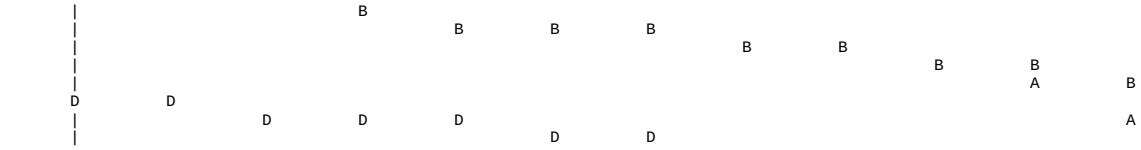
THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH = 8

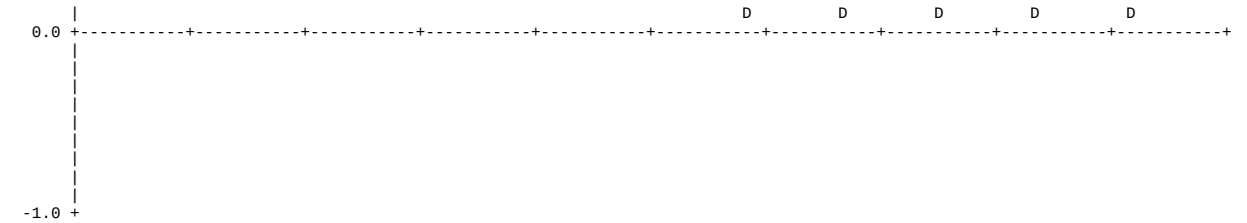
PANEL	LAYER01		LAYER02		LAYER03		LAYER04	
1174	0.01000	1303.29	1.58430	1303.29	0.02926	550.33	0.05000	544.41
1175	0.01000	1307.44	1.59027	1307.44	0.03002	550.33	0.05000	540.46
1176	0.01000	1313.98	1.59602	1313.98	0.03113	550.33	0.05000	537.23
1177	0.01000	1322.80	1.60155	1322.80	0.03257	550.33	0.05000	534.74
1178	0.01000	1334.64	1.60805	1334.64	0.03441	550.33	0.05000	532.76
1179	0.01000	1348.51	1.61463	1348.51	0.03650	550.33	0.05000	531.52
1180	0.01000	1364.41	1.61659	1364.41	0.03900	550.33	0.05000	532.40
1181	0.01000	1346.97	1.68987	1346.97	0.02693	550.33	0.05000	543.14
1182	0.01000	1352.14	1.63803	1352.14	0.03231	550.32	0.05000	546.83
1183	0.01000	1358.27	1.62571	1358.27	0.03564	550.32	0.05000	542.48
1184	0.01000	1365.25	1.65713	1365.25	0.03666	550.32	0.05000	529.26
1185	0.01000	1372.88	1.73520	1372.88	0.03517	550.32	0.05000	506.62
1186	0.01000	1380.98	1.86024	1380.98	0.03109	550.32	0.05000	474.57
1187	0.01000	1389.27	2.02694	1389.27	0.02465	550.33	0.05000	434.19
1188	0.01000	1349.99	1.68960	1349.99	0.02772	550.33	0.05000	541.60
1189	0.01000	1362.97	1.66398	1362.97	0.03201	550.32	0.05000	544.62
1190	0.01000	1374.83	1.67809	1374.83	0.03373	550.32	0.05000	540.55
1191	0.01000	1385.73	1.73630	1385.73	0.03257	550.32	0.05000	528.94
1192	0.01000	1395.39	1.83853	1395.39	0.02853	550.32	0.05000	509.64
1193	0.01000	1403.85	1.98605	1403.85	0.02146	550.32	0.05000	482.82
1194	0.01000	1410.91	2.17534	1410.91	0.01153	550.33	0.05000	449.16
1195	0.01000	1319.55	1.60326	1319.55	0.03095	550.33	0.05000	540.03
1196	0.01000	1345.04	1.67202	1345.04	0.02938	550.33	0.05000	535.59
1197	0.01000	1367.22	1.74534	1367.22	0.02653	550.33	0.05000	533.43
1198	0.01000	1386.46	1.82617	1386.46	0.02214	550.33	0.05000	533.70
1199	0.01000	1402.96	1.91071	1402.96	0.01671	550.33	0.05000	536.16
1200	0.01000	1416.35	2.00240	1416.35	0.00973	550.33	0.05000	541.16
1201	0.01000	1426.84	2.09737	1426.84	0.00131	550.33	0.05000	550.28

OPTIMIZATION SYSTEM FOR TPSSYM = 9

TOTAL NUMBER OF DESIGN VARIABLES = 36
TOTAL NUMBER OF CONSTRAINS = 652
TOTAL NUMBER OF TEMP. CONSTRAINS = 468
TOTAL NUMBER OF TEMP. PRINTOUTS = 13

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES





MAXIMUM TEMPERATURE OF EVERY LAYER

LAYER:	1	2	3	4
Tmax:	2300.33	2300.33	550.33	600.33
Optv:	1337.01	1337.01	550.27	550.27

VALUES OF DESIGN VARIABLES :

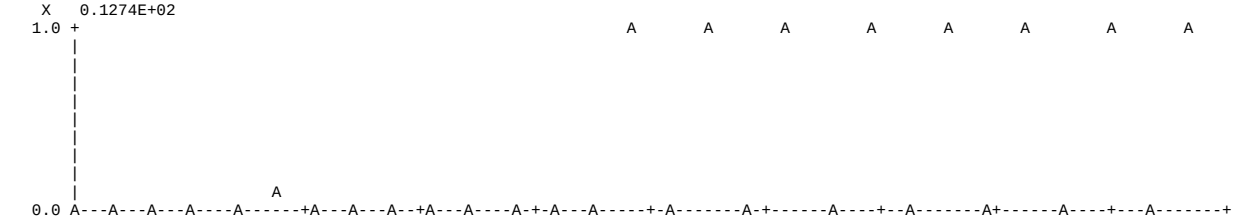
LAYER	DEV01	DEV02	DEV03	DEV04	DEV05	DEV06	DEV07	DEV08	DEV09
1	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000
2	1.36658	1.39460	1.56943	1.51552	1.57372	1.94763	1.37531	1.52683	1.56559
3	0.03455	0.03886	0.02933	0.02812	0.03084	0.00108	0.03779	0.02881	0.03050
4	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000

THE ORIGINAL OBJECTIVE FUNCTION = 94.9787903

THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.5139174

THE TOTAL OPTIMAL WEIGHT = 2.79286842E+04

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



OPTIMAL STRUCTURES OF TPS FOR PATCH = 9
(WITH AVERAGE THICKNESS)

HRSI COAT	thin skin	0.01000 in.	1337.0 F
LI-900 (P)	slab	1.53714 in.	1337.0 F
RTV-560	thin skin	0.02887 in.	550.3 F
17 LB SIP .16 IN	slab	0.05000 in.	550.3 F

THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH = 9

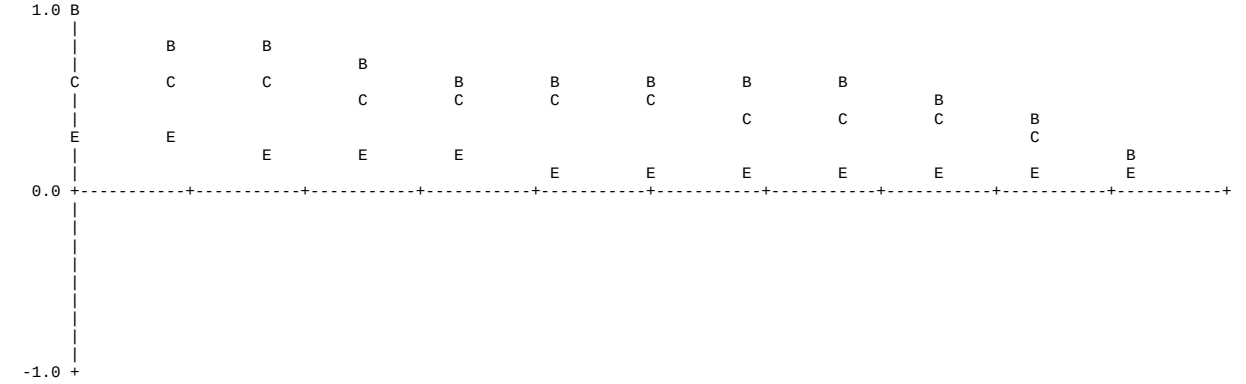
PANEL	LAYER01		LAYER02		LAYER03		LAYER04	
1886	0.01000	1230.64	1.37531	1230.64	0.03779	550.33	0.05000	543.61
1887	0.01000	1242.36	1.42777	1242.36	0.03413	550.33	0.05000	542.41
1888	0.01000	1252.52	1.46872	1252.52	0.03156	550.33	0.05000	541.54
1889	0.01000	1261.69	1.50131	1261.69	0.02982	550.33	0.05000	540.91
1890	0.01000	1270.11	1.52683	1270.11	0.02881	550.33	0.05000	540.50
1891	0.01000	1277.96	1.54593	1277.96	0.02849	550.33	0.05000	540.50
1892	0.01000	1285.98	1.55959	1285.98	0.02894	550.33	0.05000	540.50
1893	0.01000	1294.30	1.56559	1294.30	0.03050	550.33	0.05000	540.58
1894	0.01000	1264.59	1.51552	1264.59	0.02812	550.33	0.05000	545.40
1895	0.01000	1273.77	1.49282	1273.77	0.03289	550.14	0.04998	542.23
1896	0.00999	1282.15	1.50027	1282.15	0.03427	550.04	0.04997	540.71
1897	0.00999	1290.26	1.52796	1290.26	0.03344	549.98	0.04997	540.50
1898	0.00999	1298.44	1.57276	1298.44	0.03081	549.97	0.04997	540.58

1899	0.00999	1307.40	1.63838	1307.40	0.02618	550.01	0.04997	541.76
1900	0.01000	1319.78	1.75236	1319.78	0.01732	550.10	0.04998	544.51
1901	0.01000	1337.01	1.94763	1337.01	0.00108	550.33	0.05000	550.09
1902	0.01000	1259.03	1.51203	1259.03	0.02713	550.33	0.05000	547.58
1903	0.01000	1265.71	1.46663	1265.71	0.03409	550.14	0.04998	544.16
1904	0.00999	1272.85	1.46067	1272.85	0.03678	550.04	0.04997	542.47
1905	0.00999	1280.39	1.48006	1280.39	0.03675	549.99	0.04997	541.88
1906	0.00999	1288.67	1.52037	1288.67	0.03458	549.98	0.04997	542.10
1907	0.00999	1299.03	1.58930	1299.03	0.02979	550.02	0.04997	543.23
1908	0.01000	1313.99	1.71312	1313.99	0.02014	550.11	0.04998	546.01
1909	0.01000	1334.88	1.91598	1334.88	0.00325	550.33	0.05000	550.27
1910	0.01000	1213.62	1.36658	1213.62	0.03455	550.33	0.05000	550.27
1911	0.01000	1219.63	1.35434	1219.63	0.03744	550.33	0.05000	548.11
1912	0.01000	1227.09	1.35614	1227.09	0.03895	550.33	0.05000	546.61
1913	0.01000	1236.18	1.36967	1236.18	0.03940	550.33	0.05000	545.58
1914	0.01000	1246.99	1.39460	1246.99	0.03886	550.33	0.05000	544.98
1915	0.01000	1260.50	1.43402	1260.50	0.03718	550.33	0.05000	544.80
1916	0.01000	1277.44	1.49160	1277.44	0.03406	550.33	0.05000	545.14
1917	0.01000	1298.18	1.56943	1298.18	0.02933	550.33	0.05000	546.11

OPTIMIZATION SYSTEM FOR TPSSYM = 10

TOTAL NUMBER OF DESIGN VARIABLES = 80
TOTAL NUMBER OF CONSTRAINS = 1640
TOTAL NUMBER OF TEMP. CONSTRAINS = 1040
TOTAL NUMBER OF TEMP. PRINTOUTS = 13

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



MAXIMUM TEMPERATURE OF EVERY LAYER

LAYER:	1	2	3	4	5
Tmax:	2800.33	2900.33	2700.33	550.33	600.33
Optv:	1718.85	1718.85	956.42	514.00	514.00

VALUES OF DESIGN VARIABLES :

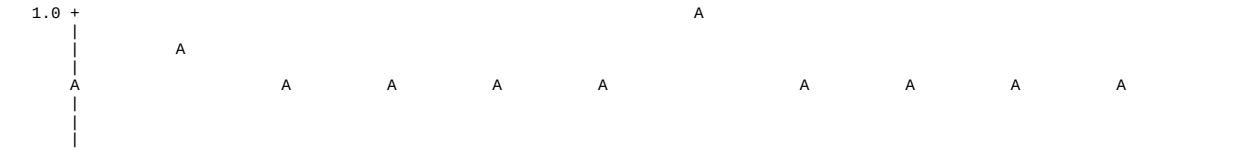
LAYER	DEV01	DEV02	DEV03	DEV04	DEV05	DEV06	DEV07	DEV08	DEV09	DEV10	DEV11	DEV12	DEV13	DEV14	DEV15	DEV16
1	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000
2	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000
3	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
4	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100
5	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000

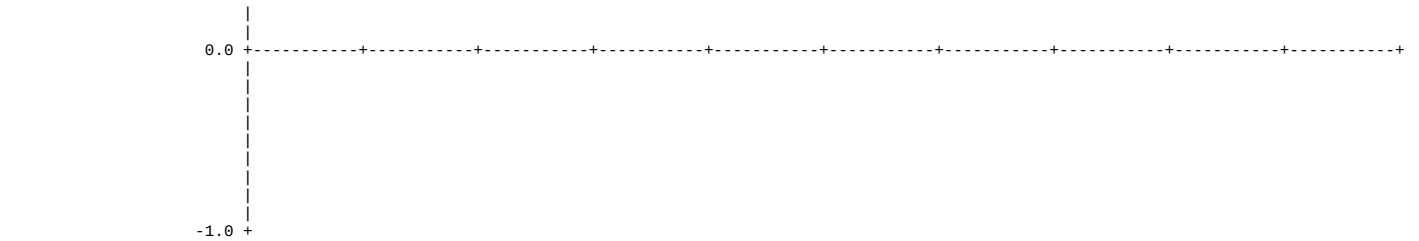
THE ORIGINAL OBJECTIVE FUNCTION = 1619.0898438

THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.1098324

THE TOTAL OPTIMAL WEIGHT = 1.39254345E+04

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES





OPTIMAL STRUCTURES OF TPS FOR PATCH = 10
(WITH AVERAGE THICKNESS)

ACC((N)	thin skin	0.01000 in.	1718.8 F
0.03000 in. ZIRCONIUM			
	radiation gap	0.01000 in.	1718.8 F
0.03000 in. ZIRCONIUM			
LI-2200 (N)	slab	0.99999 in.	956.4 F
RTV-560	thin skin	0.00100 in.	514.0 F
17 LB SIP .16 IN	slab	0.05000 in.	514.0 F

THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH = 10

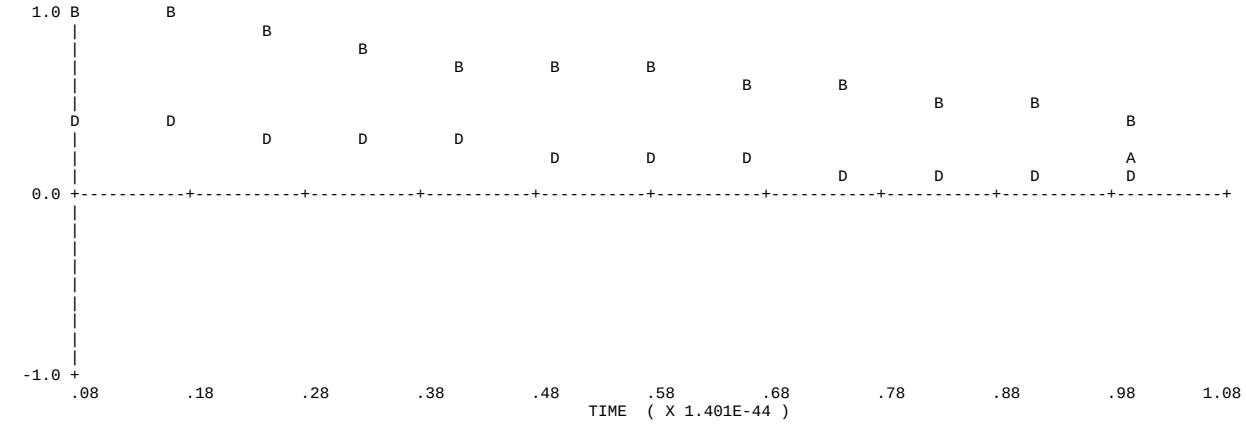
PANEL	LAYER01		LAYER02		LAYER03		LAYER04		LAYER05	
661	0.01000	1319.63	0.01000	1319.63	1.00000	1125.61	0.00100	550.05	0.05000	494.62
662	0.01000	1318.48	0.01000	1318.48	1.00000	1124.35	0.00100	550.03	0.05000	493.59
663	0.01001	1334.59	0.01001	1334.59	1.00090	1136.47	0.00100	550.33	0.05005	500.65
664	0.00999	1307.50	0.00999	1307.50	0.99948	1112.43	0.00100	545.31	0.04997	483.13
665	0.01000	1297.79	0.01000	1297.79	1.00000	1102.02	0.00100	549.90	0.05000	475.22
666	0.01000	1296.39	0.01000	1296.39	1.00000	1100.52	0.00100	549.90	0.05000	473.99
667	0.01001	1306.97	0.01001	1306.97	1.00057	1108.81	0.00100	550.33	0.05003	479.00
668	0.01000	1301.86	0.01000	1301.86	1.00002	1102.65	0.00100	546.53	0.05000	473.47
669	0.01000	1269.32	0.01000	1269.32	1.00000	1071.67	0.00100	549.90	0.05000	450.14
670	0.01000	1267.88	0.01000	1267.88	1.00000	1070.14	0.00100	549.90	0.05000	448.87
671	0.01001	1283.06	0.01001	1283.06	1.00059	1082.19	0.00100	550.33	0.05003	455.87
672	0.01000	1259.51	0.01000	1259.51	0.99983	1059.34	0.00100	540.98	0.04999	441.27
673	0.01000	1233.80	0.01000	1233.80	1.00000	1034.08	0.00100	550.03	0.05000	418.94
674	0.01000	1238.37	0.01000	1238.37	1.00016	1037.56	0.00100	550.33	0.05001	420.37
675	0.01000	1218.31	0.01000	1218.31	1.00007	1016.22	0.00100	544.61	0.05000	407.29
676	0.01000	1045.70	0.01000	1045.70	0.99975	860.30	0.00100	479.03	0.04999	321.18
677	0.01000	1190.83	0.01000	1190.83	1.00000	988.81	0.00100	550.33	0.05000	381.25
678	0.01000	1164.41	0.01000	1164.41	1.00000	962.11	0.00100	550.33	0.05000	364.87
679	0.01000	1083.32	0.01000	1083.32	1.00000	885.32	0.00100	505.23	0.05000	323.16
680	0.01000	996.19	0.01000	996.19	1.00000	802.46	0.00100	442.92	0.05000	277.11
1001	0.01000	1236.21	0.01000	1236.21	0.99950	1008.01	0.00100	550.33	0.04998	359.86
1002	0.01000	1202.19	0.01000	1202.19	0.99976	974.02	0.00100	547.55	0.04999	341.41
1003	0.01001	1033.13	0.01001	1033.13	1.00097	847.38	0.00100	512.03	0.05005	315.86
1004	0.01000	1512.05	0.01000	1512.05	1.00013	1159.55	0.00100	493.69	0.05001	365.76
1005	0.01000	1218.34	0.01000	1218.34	0.99959	1005.19	0.00100	550.33	0.04998	373.09
1006	0.01000	1176.82	0.01000	1176.82	0.99973	966.86	0.00100	549.05	0.04999	352.62
1007	0.01001	1056.95	0.01001	1056.95	1.00102	875.06	0.00100	523.90	0.05005	334.11
1008	0.01000	1636.22	0.01000	1636.22	1.00013	1250.66	0.00100	507.59	0.05001	389.93
1009	0.01000	1218.59	0.01000	1218.59	0.99975	1016.46	0.00100	549.75	0.04999	393.70
1010	0.01000	1174.58	0.01000	1174.58	0.99977	977.51	0.00100	549.88	0.04999	372.84
1011	0.01001	1092.55	0.01001	1092.55	1.00091	913.10	0.00100	534.50	0.05005	359.35
1012	0.01000	1708.79	0.01000	1708.79	1.00009	1309.26	0.00100	522.46	0.05000	411.59
1013	0.01000	1231.21	0.01000	1231.21	0.99991	1036.91	0.00100	549.71	0.05000	418.52
1014	0.01000	1189.85	0.01000	1189.85	0.99987	1001.10	0.00100	550.25	0.04999	399.02
1015	0.01001	1136.61	0.01001	1136.61	1.00068	957.90	0.00100	543.40	0.05003	388.73
1016	0.01000	1718.85	0.01000	1718.85	1.00003	1337.18	0.00100	537.09	0.05000	429.39
1017	0.01000	1251.07	0.01000	1251.07	1.00000	1062.08	0.00100	550.33	0.05000	444.49
1018	0.01000	1217.07	0.01000	1217.07	1.00001	1032.82	0.00100	550.33	0.05000	428.15
1019	0.01000	1184.73	0.01000	1184.73	1.00037	1005.23	0.00100	550.33	0.05002	419.29
1020	0.01000	1718.85	0.01000	1718.85	1.00000	1337.18	0.00100	550.33	0.05000	441.95
1021	0.01000	1281.68	0.01000	1281.68	1.00000	1092.55	0.00100	550.33	0.05000	468.24
1022	0.01000	1249.85	0.01000	1249.85	1.00018	1067.33	0.00100	550.30	0.05001	457.14
1023	0.01000	1228.93	0.01000	1228.93	1.00001	1048.77	0.00100	550.33	0.05000	448.13
1024	0.01000	1641.12	0.01000	1641.12	1.00000	1295.58	0.00100	550.33	0.05000	447.82
1025	0.01000	1307.46	0.01000	1307.46	1.00000	1118.00	0.00100	550.33	0.05000	488.44
1026	0.01000	1284.29	0.01000	1284.29	1.00034	1101.00	0.00100	550.28	0.05002	483.22
1027	0.01000	1268.51	0.01000	1268.51	0.99965	1086.44	0.00100	550.33	0.04998	472.36
1028	0.01000	1548.01	0.01000	1548.01	0.99997	1241.24	0.00100	550.33	0.05000	448.44
1029	0.01000	1326.19	0.01000	1326.19	1.00000	1136.13	0.00100	550.33	0.05000	503.05
1030	0.01000	1315.14	0.01000	1315.14	1.00049	1129.24	0.00100	550.33	0.05002	503.43
1031	0.00999	1298.15	0.00999	1298.15	0.99933	1113.36	0.00100	550.33	0.04997	488.83

1032	0.01000	1444.23	0.01000	1444.23	0.99994	1176.07	0.00100	550.33	0.05000	442.34
1033	0.01000	1335.63	0.01000	1335.63	1.00000	1144.63	0.00100	550.33	0.05000	510.03
1034	0.01001	1337.11	0.01001	1337.11	1.00059	1147.43	0.00100	550.33	0.05003	514.00
1035	0.00999	1312.22	0.00999	1312.22	0.99907	1124.44	0.00100	550.33	0.04995	494.35
1036	0.01000	1334.21	0.01000	1334.21	0.99995	1101.79	0.00100	550.33	0.05000	428.13
1037	0.01000	1333.56	0.01000	1333.56	1.00000	1141.20	0.00100	550.33	0.05000	507.33
1038	0.01001	1344.81	0.01001	1344.81	1.00062	1150.84	0.00100	550.33	0.05003	514.00
1039	0.00999	1304.95	0.00999	1304.95	0.99892	1114.43	0.00100	549.81	0.04995	485.67
1040	0.01000	1223.40	0.01000	1223.40	1.00000	1021.00	0.00100	550.33	0.05000	404.76
1290	0.01000	1088.41	0.01000	1088.41	1.00000	900.46	0.00100	528.63	0.05000	344.74
1291	0.01000	1439.45	0.01000	1439.45	1.00000	1129.18	0.00100	550.33	0.05000	377.88
1292	0.01000	1050.82	0.01000	1050.82	1.00000	848.58	0.00100	481.48	0.05000	316.62
1293	0.01000	1042.78	0.01000	1042.78	1.00000	841.70	0.00100	476.12	0.05000	311.62
1294	0.01000	1173.42	0.01000	1173.42	0.99992	958.38	0.00100	540.83	0.05000	350.39
1295	0.01000	1359.89	0.01000	1359.89	0.99988	1073.52	0.00100	548.01	0.04999	359.94
1296	0.01000	1028.23	0.01000	1028.23	1.00034	832.90	0.00100	486.98	0.05002	308.85
1297	0.01000	1188.35	0.01000	1188.35	1.00000	938.07	0.00100	478.39	0.05000	325.34
1298	0.01000	1221.64	0.01000	1221.64	0.99975	991.87	0.00100	548.04	0.04999	353.32
1299	0.01000	1296.76	0.01000	1296.76	0.99982	1031.01	0.00100	547.09	0.04999	348.24
1300	0.01001	1024.96	0.01001	1024.96	1.00061	832.38	0.00100	494.79	0.05003	307.00
1301	0.01000	1316.99	0.01000	1316.99	1.00000	1024.26	0.00100	481.80	0.05000	338.93
1302	0.01000	1246.97	0.01000	1246.97	0.99958	1010.58	0.00100	550.33	0.04998	355.69
1303	0.01000	1246.59	0.01000	1246.59	0.99979	998.83	0.00100	546.64	0.04999	341.73
1304	0.01001	1026.16	0.01001	1026.16	1.00079	836.30	0.00100	502.45	0.05004	308.56
1305	0.01000	1395.98	0.01000	1395.98	1.00008	1078.08	0.00100	485.20	0.05000	348.47

OPTIMIZATION SYSTEM FOR TPSSYM = 11

TOTAL NUMBER OF DESIGN VARIABLES = 36
TOTAL NUMBER OF CONSTRAINS = 1196
TOTAL NUMBER OF TEMP. CONSTRAINS = 468
TOTAL NUMBER OF TEMP. PRINTOUTS = 13

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



MAXIMUM TEMPERATURE OF EVERY LAYER

LAYER:	1	2	3	4
Tmax:	2300.33	2300.33	550.33	600.33
Optv:	1425.15	1425.15	549.84	549.84

VALUES OF DESIGN VARIABLES :

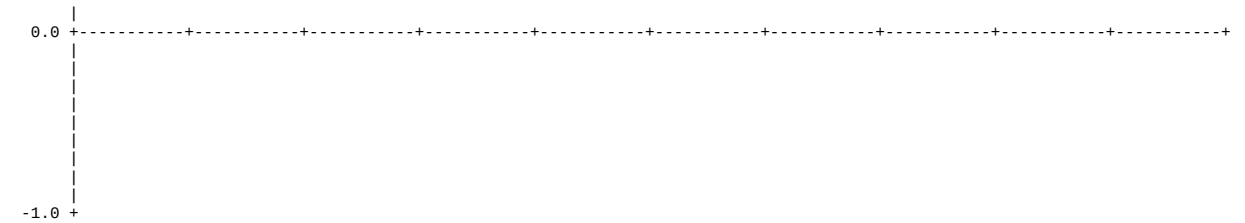
LAYER	DEV01	DEV02	DEV03	DEV04	DEV05	DEV06	DEV07	DEV08	DEV09
1	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000
2	1.30766	1.15843	1.16613	1.41172	1.47614	1.40625	1.24850	1.25626	1.21618
3	0.02776	0.02951	0.02978	0.03979	0.03463	0.03950	0.04086	0.03060	0.03115
4	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000

THE ORIGINAL OBJECTIVE FUNCTION = 296.8915405

THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.4759319

THE TOTAL OPTIMAL WEIGHT = 3.06143389E+04

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



OPTIMAL STRUCTURES OF TPS FOR PATCH = 11
(WITH AVERAGE THICKNESS)

HRSI COAT	thin skin	0.01000 in.	1425.2 F
LI-900 (P)	slab	1.29418 in.	1425.2 F
RTV-560	thin skin	0.03373 in.	549.8 F
17 LB SIP .16 IN	slab	0.05000 in.	549.8 F

THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH = 11

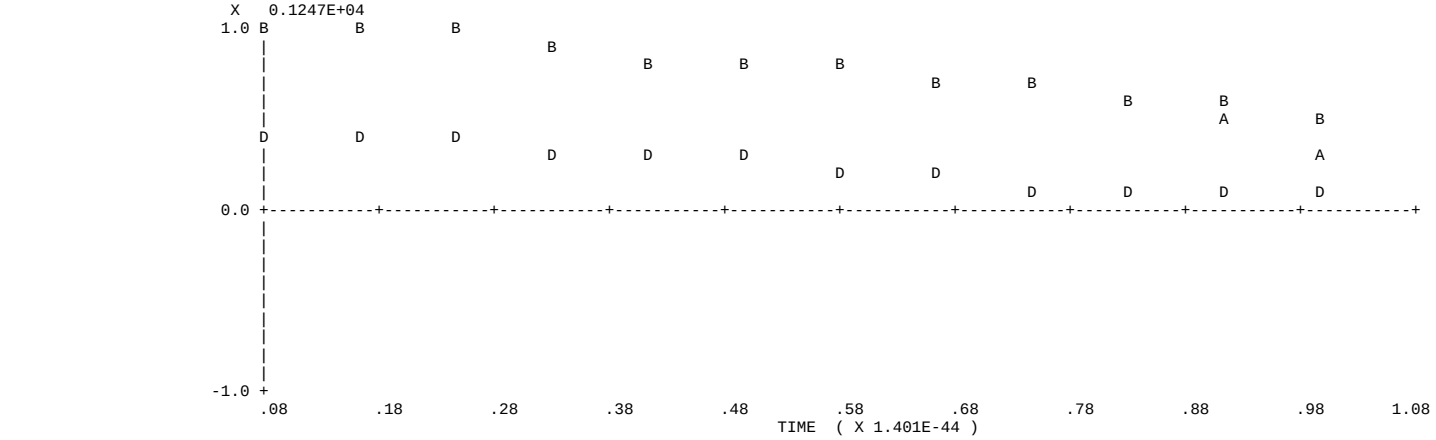
PANEL	LAYER01		LAYER02		LAYER03		LAYER04	
1071	0.01000	1214.08	1.34207	1214.08	0.03655	550.33	0.05000	549.25
1072	0.01000	1235.72	1.37045	1235.72	0.03778	550.33	0.05000	549.15
1073	0.01000	1251.72	1.39176	1251.72	0.03871	550.33	0.05000	549.07
1074	0.01000	1262.08	1.40599	1262.08	0.03935	550.33	0.05000	549.02
1075	0.01000	1266.80	1.41315	1266.80	0.03970	550.33	0.05000	548.99
1076	0.01000	1265.88	1.41324	1265.88	0.03975	550.33	0.05000	548.99
1077	0.01000	1259.33	1.40625	1259.33	0.03950	550.33	0.05000	549.01
1078	0.01000	1248.30	1.39724	1248.30	0.03859	550.33	0.05000	549.06
1079	0.01000	1230.54	1.37910	1230.54	0.03750	550.33	0.05000	549.14
1080	0.01000	1206.05	1.35179	1206.05	0.03625	550.33	0.05000	549.23
1081	0.01000	1226.71	1.37868	1226.71	0.03460	550.33	0.05000	549.27
1082	0.01000	1251.15	1.41533	1251.15	0.03526	550.33	0.05001	549.18
1083	0.01000	1269.37	1.44436	1269.37	0.03563	550.33	0.05001	549.12
1084	0.01000	1281.17	1.46539	1281.17	0.03573	550.33	0.05001	549.08
1085	0.01000	1286.44	1.47806	1286.44	0.03558	550.33	0.05001	549.07
1086	0.01000	1285.13	1.48192	1285.13	0.03520	550.33	0.05001	549.07
1087	0.01000	1277.42	1.47649	1277.42	0.03464	550.33	0.05001	549.10
1088	0.01000	1263.23	1.45787	1263.23	0.03420	550.33	0.05001	549.15
1089	0.01000	1243.54	1.43015	1243.54	0.03362	550.33	0.05001	549.21
1090	0.01000	1218.85	1.39341	1218.85	0.03293	550.33	0.05001	549.29
1091	0.01000	1237.16	1.41781	1237.16	0.03324	550.33	0.05001	549.24
1092	0.01000	1258.75	1.45337	1258.75	0.03374	550.33	0.05001	549.16
1093	0.01000	1273.61	1.47939	1273.61	0.03408	550.33	0.05001	549.11
1094	0.01000	1281.90	1.49554	1281.90	0.03429	550.33	0.05002	549.08
1095	0.01000	1284.01	1.50145	1284.01	0.03440	550.33	0.05002	549.06
1096	0.01000	1280.83	1.49665	1280.83	0.03445	550.33	0.05002	549.07
1097	0.01000	1274.39	1.48072	1274.39	0.03453	550.33	0.05002	549.09
1098	0.01000	1269.21	1.46138	1269.21	0.03416	550.33	0.05001	549.14
1099	0.01000	1263.23	1.43502	1263.23	0.03366	550.33	0.05001	549.21
1100	0.01000	1258.38	1.40256	1258.38	0.03300	550.33	0.05001	549.30
1101	0.01000	1228.67	1.41443	1228.67	0.03509	550.33	0.05001	549.11
1102	0.01000	1242.10	1.44236	1242.10	0.03576	550.33	0.05001	549.05
1103	0.01000	1249.57	1.45930	1249.57	0.03640	550.33	0.05001	549.00
1104	0.01000	1251.86	1.46490	1251.86	0.03705	550.33	0.05001	548.97
1105	0.01000	1250.43	1.45886	1250.43	0.03778	550.33	0.05001	548.95
1106	0.01000	1248.12	1.44100	1248.12	0.03865	550.33	0.05001	548.95
1107	0.01000	1250.76	1.41172	1250.76	0.03979	550.33	0.05000	548.97
1108	0.01000	1269.72	1.40789	1269.72	0.03860	550.33	0.05000	549.05
1109	0.01000	1291.14	1.39999	1291.14	0.03720	550.33	0.05000	549.15
1110	0.01000	1315.03	1.38800	1315.03	0.03558	550.33	0.05000	549.27
1126	0.01000	1116.63	1.21618	1116.63	0.03115	550.33	0.05000	549.69
1127	0.01000	1136.20	1.24133	1136.20	0.03223	550.33	0.05000	549.60
1128	0.01000	1156.01	1.26684	1156.01	0.03332	550.33	0.05000	549.51
1129	0.01000	1175.16	1.29156	1175.16	0.03437	550.33	0.05000	549.43
1130	0.01000	1192.92	1.31456	1192.92	0.03536	550.33	0.05000	549.34
1131	0.01000	1131.61	1.25626	1131.61	0.03060	550.33	0.05000	549.59
1132	0.01000	1144.42	1.26961	1144.42	0.03116	550.33	0.05000	549.58
1133	0.01000	1161.04	1.28467	1161.04	0.03243	550.33	0.05000	549.51
1134	0.01000	1179.81	1.30689	1179.81	0.03355	550.33	0.05000	549.43
1135	0.01000	1201.14	1.33914	1201.14	0.03408	550.33	0.05000	549.35
1136	0.01000	1156.70	1.26852	1156.70	0.03377	550.33	0.05000	549.35
1137	0.01000	1161.85	1.29618	1161.85	0.03228	550.33	0.05000	549.42
1138	0.01000	1176.37	1.32353	1176.37	0.03196	550.33	0.05000	549.42
1139	0.01000	1194.83	1.35151	1194.83	0.03224	550.33	0.05001	549.38
1140	0.01000	1214.44	1.38146	1214.44	0.03270	550.33	0.05001	549.31
1141	0.01000	1191.02	1.24850	1191.02	0.04086	550.33	0.05000	548.97
1142	0.01000	1180.35	1.28166	1180.35	0.03767	550.33	0.05000	549.11
1143	0.01000	1184.48	1.31641	1184.48	0.03575	550.33	0.05000	549.18
1144	0.01000	1196.89	1.35050	1196.89	0.03482	550.33	0.05001	549.20
1145	0.01000	1212.18	1.38207	1212.18	0.03466	550.33	0.05001	549.17

1158	0.01000	1116.63	1.21618	1116.63	0.03115	550.33	0.05000	549.69
1159	0.01000	1116.63	1.21618	1116.63	0.03115	550.33	0.05000	549.69
1160	0.01000	1116.63	1.21618	1116.63	0.03115	550.33	0.05000	549.69
1161	0.01000	1117.57	1.22055	1117.57	0.03098	550.33	0.05000	549.69
1162	0.01000	1131.61	1.25626	1131.61	0.03060	550.33	0.05000	549.59
1163	0.01000	1131.61	1.25626	1131.61	0.03060	550.33	0.05000	549.59
1164	0.01000	1131.61	1.25626	1131.61	0.03060	550.33	0.05000	549.59
1165	0.01000	1134.32	1.25962	1134.32	0.03079	550.33	0.05000	549.57
1166	0.01000	1143.64	1.26666	1143.64	0.03178	550.33	0.05000	549.48
1167	0.01000	1147.79	1.26805	1147.79	0.03235	550.33	0.05000	549.44
1168	0.01000	1153.08	1.26865	1153.08	0.03317	550.33	0.05000	549.39
1169	0.01000	1161.64	1.26736	1161.64	0.03466	550.33	0.05000	549.30
1170	0.01000	1177.46	1.25945	1177.46	0.03783	550.33	0.05000	549.13
1171	0.01000	1188.50	1.25077	1188.50	0.04028	550.33	0.05000	549.00
1172	0.01000	1191.02	1.24850	1191.02	0.04086	550.33	0.05000	548.97
1173	0.01000	1191.02	1.24850	1191.02	0.04086	550.33	0.05000	548.97
1348	0.01000	1335.64	1.37563	1335.64	0.03416	550.33	0.05000	549.37
1349	0.01000	1254.33	1.37275	1254.33	0.03229	550.33	0.05001	549.39
1350	0.01000	1194.70	1.35652	1194.70	0.03233	550.33	0.05001	549.37
1351	0.01000	1181.40	1.32255	1181.40	0.03515	550.33	0.05000	549.32
1355	0.01000	1351.81	1.36487	1351.81	0.03303	550.33	0.05000	549.45
1356	0.01000	1247.81	1.34716	1247.81	0.03163	550.33	0.05001	549.46
1357	0.01000	1172.67	1.32370	1172.67	0.03186	550.33	0.05001	549.44
1358	0.01000	1159.88	1.29594	1159.88	0.03426	550.33	0.05000	549.40
1362	0.01000	1368.78	1.35275	1368.78	0.03182	550.33	0.05000	549.54
1363	0.01000	1240.31	1.31877	1240.31	0.03094	550.33	0.05001	549.53
1364	0.01000	1148.46	1.28760	1148.46	0.03134	550.33	0.05001	549.51
1365	0.01000	1136.08	1.26631	1136.08	0.03329	550.33	0.05000	549.49
1369	0.01000	1377.89	1.33657	1377.89	0.03053	550.33	0.05000	549.63
1370	0.01000	1231.30	1.28750	1231.30	0.03020	550.33	0.05000	549.62
1371	0.01000	1121.96	1.24817	1121.96	0.03076	550.33	0.05000	549.59
1372	0.01000	1110.29	1.23380	1110.29	0.03222	550.33	0.05000	549.59
1376	0.01000	1406.47	1.32332	1406.47	0.02912	550.33	0.05000	549.74
1377	0.01000	1220.67	1.25322	1220.67	0.02943	550.33	0.05000	549.70
1378	0.01000	1093.05	1.20531	1093.05	0.03012	550.33	0.05000	549.68
1379	0.01000	1082.67	1.19869	1082.67	0.03105	550.33	0.05000	549.69
1383	0.01000	1425.15	1.30766	1425.15	0.02776	550.33	0.05000	549.84
1384	0.01000	1182.65	1.20782	1182.65	0.02881	550.33	0.05000	549.79
1385	0.01000	1055.77	1.15843	1055.77	0.02951	550.33	0.05000	549.78
1386	0.01000	1061.07	1.16613	1061.07	0.02978	550.33	0.05000	549.81

OPTIMIZATION SYSTEM FOR TPSSYM = 12

TOTAL NUMBER OF DESIGN VARIABLES = 36
TOTAL NUMBER OF CONSTRAINS = 996
TOTAL NUMBER OF TEMP. CONSTRAINS = 468
TOTAL NUMBER OF TEMP. PRINTOUTS = 13

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



MAXIMUM TEMPERATURE OF EVERY LAYER

LAYER:	1	2	3	4
Tmax:	2300.33	2300.33	550.33	600.33
Optv:	1246.96	1246.96	550.14	550.14

VALUES OF DESIGN VARIABLES :

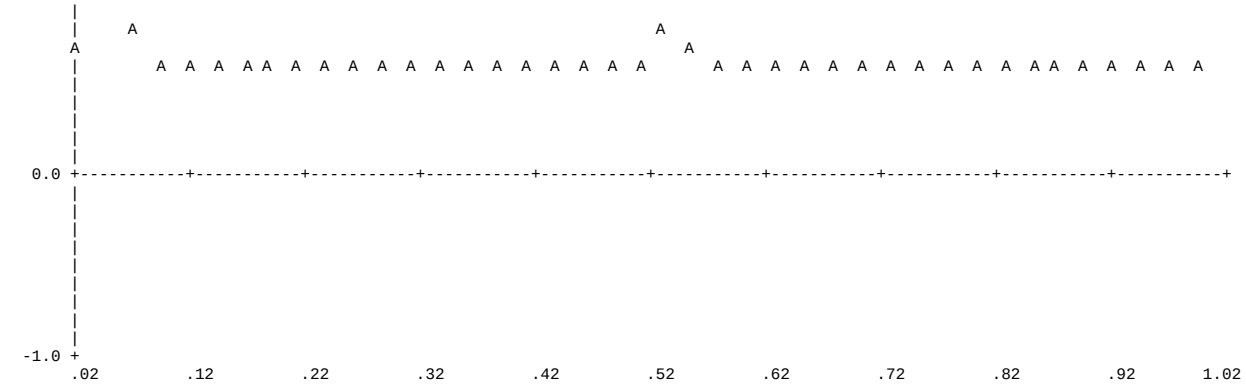
LAYER	DEV01	DEV02	DEV03	DEV04	DEV05	DEV06	DEV07	DEV08	DEV09
1	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000
2	1.16452	1.16872	1.15166	1.58434	1.35072	1.24258	1.16777	1.14984	1.13925
3	0.03053	0.03045	0.03064	0.01750	0.03675	0.04225	0.03322	0.03308	0.03286
4	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000

THE ORIGINAL OBJECTIVE FUNCTION = 222.6478729

THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.4537162

THE TOTAL OPTIMAL WEIGHT = 2.24091533E+04

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



OPTIMAL STRUCTURES OF TPS FOR PATCH = 12
(WITH AVERAGE THICKNESS)

HRSI COAT	thin skin	0.01000 in.	1247.0 F
LI-900 (P)	slab	1.23548 in.	1247.0 F
RTV-560	thin skin	0.03192 in.	550.1 F
17 LB SIP .16 IN	slab	0.05000 in.	550.1 F

THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH = 12

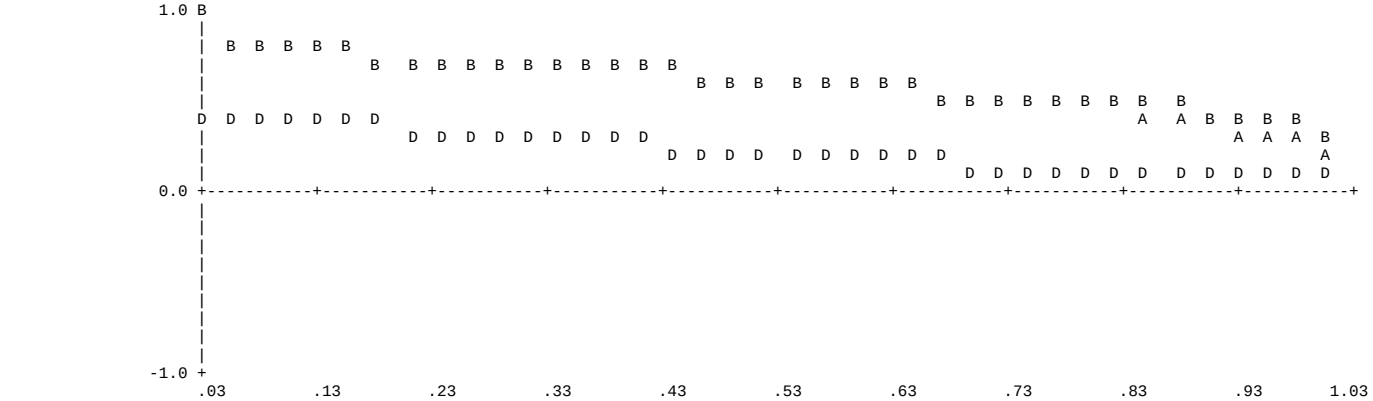
PANEL	LAYER01		LAYER02		LAYER03		LAYER04	
1041	0.01000	1148.16	1.20468	1148.16	0.03902	550.33	0.05000	549.33
1042	0.01000	1165.90	1.21969	1165.90	0.04042	550.33	0.05000	549.16
1043	0.01000	1179.32	1.23121	1179.32	0.04149	550.33	0.05000	549.03
1044	0.01000	1188.40	1.23923	1188.40	0.04221	550.33	0.05000	548.94
1045	0.01000	1193.11	1.24378	1193.11	0.04258	550.33	0.05000	548.90
1046	0.01000	1193.42	1.24487	1193.42	0.04260	550.33	0.05000	548.90
1047	0.01000	1189.29	1.24258	1189.29	0.04225	550.33	0.05000	548.90
1048	0.01000	1184.58	1.24294	1184.58	0.04171	550.33	0.05000	548.90
1049	0.01000	1175.85	1.24141	1175.85	0.04068	550.32	0.05000	548.94
1050	0.01000	1162.91	1.23757	1162.91	0.03918	550.32	0.05000	549.03
1051	0.01000	1164.70	1.26419	1164.70	0.03610	550.32	0.05000	549.38
1052	0.01000	1185.63	1.29477	1185.63	0.03656	550.31	0.05000	549.23
1053	0.01000	1201.86	1.31976	1201.86	0.03680	550.31	0.05000	549.10
1054	0.01000	1213.33	1.33852	1213.33	0.03690	550.31	0.05000	549.02
1055	0.01000	1219.92	1.35027	1219.92	0.03689	550.31	0.05000	548.96
1056	0.01000	1221.57	1.35448	1221.57	0.03683	550.31	0.05000	548.93
1057	0.01000	1218.22	1.35067	1218.22	0.03675	550.31	0.05000	548.93
1058	0.01000	1212.33	1.35475	1212.33	0.03546	550.31	0.05000	549.01
1059	0.01000	1201.26	1.35092	1201.26	0.03411	550.31	0.05000	549.13
1060	0.01000	1184.86	1.33780	1184.86	0.03281	550.31	0.05000	549.26
1061	0.01000	1187.92	1.38274	1187.92	0.02732	550.32	0.05000	549.91
1062	0.01000	1211.55	1.44609	1211.55	0.02494	550.32	0.05000	549.94
1063	0.01000	1229.85	1.50008	1229.85	0.02262	550.33	0.05000	549.98
1064	0.01000	1242.67	1.54273	1242.67	0.02056	550.33	0.05000	550.04
1065	0.01000	1246.96	1.57210	1246.96	0.01892	550.33	0.05000	550.09
1066	0.01000	1246.96	1.58649	1246.96	0.01785	550.33	0.05000	550.12
1067	0.01000	1246.96	1.58434	1246.96	0.01750	550.33	0.05000	550.14
1068	0.01000	1236.61	1.56397	1236.61	0.01801	550.33	0.05000	550.11
1069	0.01000	1220.79	1.52999	1220.79	0.01899	550.33	0.05000	550.09
1070	0.01000	1199.48	1.48241	1199.48	0.02043	550.33	0.05000	550.05
1111	0.01000	1070.70	1.13925	1070.70	0.03286	550.33	0.05000	550.05
1112	0.01000	1087.10	1.15278	1087.10	0.03419	550.33	0.05000	549.91
1113	0.01000	1103.05	1.16639	1103.05	0.03546	550.33	0.05000	549.76
1114	0.01000	1118.14	1.17961	1118.14	0.03663	550.33	0.05000	549.62
1115	0.01000	1131.63	1.19104	1131.63	0.03769	550.33	0.05000	549.49
1116	0.01000	1078.27	1.14984	1078.27	0.03308	550.33	0.05000	550.08
1117	0.01000	1095.94	1.17350	1095.94	0.03368	550.33	0.05000	549.94
1118	0.01000	1114.15	1.19849	1114.15	0.03420	550.32	0.05000	549.80
1119	0.01000	1131.63	1.22353	1131.63	0.03460	550.32	0.05000	549.68
1120	0.01000	1146.37	1.24173	1146.37	0.03526	550.32	0.05000	549.55
1121	0.01000	1098.14	1.16777	1098.14	0.03322	550.33	0.05000	550.06
1122	0.01000	1112.34	1.20801	1112.34	0.03199	550.33	0.05000	550.04
1123	0.01000	1129.76	1.24675	1129.76	0.03118	550.33	0.05000	549.99
1124	0.01000	1148.50	1.28879	1148.50	0.03012	550.33	0.05000	549.95
1125	0.01000	1166.20	1.32995	1166.20	0.02896	550.32	0.05000	549.93

1146	0.01000	1070.70	1.13925	1070.70	0.03286	550.33	0.05000	550.05
1147	0.01000	1070.70	1.13925	1070.70	0.03286	550.33	0.05000	550.05
1148	0.01000	1070.70	1.13925	1070.70	0.03286	550.33	0.05000	550.05
1149	0.01000	1070.70	1.13925	1070.70	0.03286	550.33	0.05000	550.05
1150	0.01000	1078.27	1.14984	1078.27	0.03308	550.33	0.05000	550.08
1151	0.01000	1078.27	1.14984	1078.27	0.03308	550.33	0.05000	550.08
1152	0.01000	1078.27	1.14984	1078.27	0.03308	550.33	0.05000	550.08
1153	0.01000	1078.27	1.14984	1078.27	0.03308	550.33	0.05000	550.08
1154	0.01000	1085.93	1.15718	1085.93	0.03315	550.33	0.05000	550.08
1155	0.01000	1088.16	1.15919	1088.16	0.03317	550.33	0.05000	550.07
1156	0.01000	1094.27	1.16450	1094.27	0.03320	550.33	0.05000	550.07
1157	0.01000	1098.14	1.16777	1098.14	0.03322	550.33	0.05000	550.06
1352	0.01000	1178.17	1.43380	1178.17	0.02194	550.33	0.05000	550.02
1353	0.01000	1167.02	1.31599	1167.02	0.03213	550.32	0.05000	549.37
1354	0.01000	1147.72	1.22855	1147.72	0.03775	550.32	0.05000	549.16
1359	0.01000	1159.35	1.39040	1159.35	0.02330	550.33	0.05000	550.00
1360	0.01000	1150.35	1.29085	1150.35	0.03196	550.32	0.05000	549.45
1361	0.01000	1132.23	1.21562	1132.23	0.03663	550.32	0.05000	549.28
1366	0.01000	1138.38	1.34166	1138.38	0.02484	550.33	0.05000	549.97
1367	0.01000	1131.75	1.26294	1131.75	0.03176	550.32	0.05000	549.54
1368	0.01000	1114.95	1.20154	1114.95	0.03535	550.33	0.05000	549.41
1373	0.01000	1115.30	1.28767	1115.30	0.02657	550.33	0.05000	549.94
1374	0.01000	1111.27	1.23270	1111.27	0.03148	550.32	0.05000	549.64
1375	0.01000	1095.87	1.18640	1095.87	0.03391	550.33	0.05000	549.56
1380	0.01000	1090.01	1.22801	1090.01	0.02849	550.33	0.05000	549.90
1381	0.01000	1088.93	1.20089	1088.93	0.03106	550.33	0.05000	549.76
1382	0.01000	1075.09	1.17046	1075.09	0.03230	550.33	0.05000	549.73
1387	0.01000	1063.04	1.16452	1063.04	0.03053	550.33	0.05000	549.87
1388	0.01000	1065.03	1.16872	1065.03	0.03045	550.33	0.05000	549.90
1389	0.01000	1051.35	1.15166	1051.35	0.03064	550.33	0.05000	549.89

OPTIMIZATION SYSTEM FOR TPSSYM = 13

TOTAL NUMBER OF DESIGN VARIABLES = 36
TOTAL NUMBER OF CONSTRAINS = 2040
TOTAL NUMBER OF TEMP. CONSTRAINS = 1440
TOTAL NUMBER OF TEMP. PRINTOUTS = 40

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



MAXIMUM TEMPERATURE OF EVERY LAYER

LAYER:	1	2	3	4
Tmax:	2300.33	2300.33	550.33	600.33
Optv:	1417.77	1417.77	550.00	550.00

VALUES OF DESIGN VARIABLES :

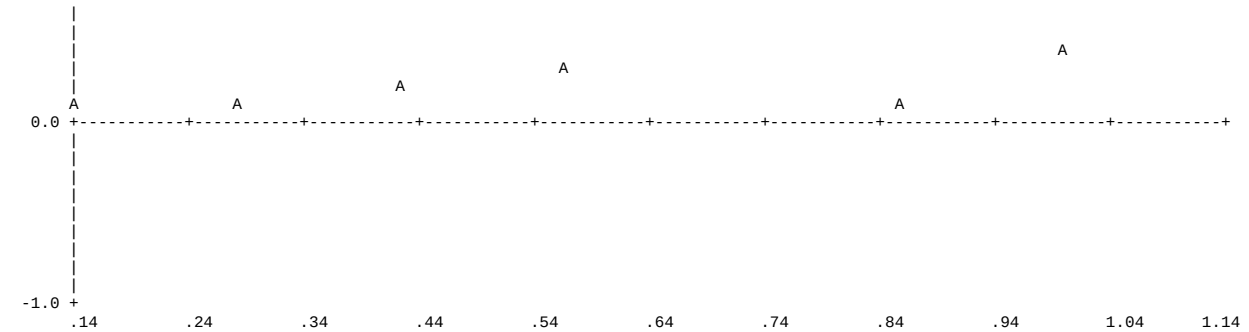
LAYER	DEV01	DEV02	DEV03	DEV04	DEV05	DEV06	DEV07	DEV08	DEV09
1	0.01000	0.01000	0.01000	0.01015	0.01000	0.01000	0.01000	0.01000	0.01000
2	1.28395	1.03009	1.02402	1.31879	1.22340	1.19037	1.50502	1.49693	1.49431
3	0.02062	0.04959	0.05020	0.03379	0.03573	0.03652	0.00118	0.00115	0.00115
4	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000

THE ORIGINAL OBJECTIVE FUNCTION = 249.3671265

THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.4470765

THE TOTAL OPTIMAL WEIGHT = 2.38048271E+04

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



OPTIMAL STRUCTURES OF TPS FOR PATCH = 13
(WITH AVERAGE THICKNESS)

HRSI COAT	thin skin	0.01002 in.	1417.8 F
LI-900 (P)	slab	1.28521 in.	1417.8 F
RTV-560	thin skin	0.02555 in.	550.0 F
17 LB SIP .16 IN	slab	0.05000 in.	550.0 F

THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH = 13

PANEL	LAYER01		LAYER02		LAYER03		LAYER04	
1686	0.01009	1379.15	1.42635	1379.15	0.01795	550.33	0.05000	544.20
1687	0.01004	1362.72	1.42068	1362.72	0.01611	550.33	0.05000	543.83
1688	0.01000	1343.70	1.40728	1343.70	0.01471	550.33	0.05000	543.46
1689	0.01000	1330.08	1.38750	1330.08	0.01479	550.33	0.05000	543.26
1694	0.01011	1394.12	1.40345	1394.12	0.02231	550.33	0.05000	542.80
1695	0.01005	1374.29	1.39448	1374.29	0.02026	550.33	0.05000	542.61
1696	0.01000	1352.36	1.37688	1352.36	0.01882	550.32	0.05000	542.36
1697	0.01000	1336.29	1.35269	1336.29	0.01899	550.33	0.05000	542.10
1702	0.01013	1405.68	1.38254	1405.68	0.02598	550.33	0.05000	541.70
1703	0.01006	1382.92	1.36879	1382.92	0.02395	550.33	0.05000	541.66
1704	0.01000	1359.02	1.34655	1359.02	0.02267	550.32	0.05000	541.50
1705	0.01000	1341.18	1.31864	1341.18	0.02296	550.33	0.05000	541.20
1710	0.01014	1413.82	1.36362	1413.82	0.02897	550.33	0.05000	540.90
1711	0.01006	1388.61	1.34340	1388.61	0.02720	550.32	0.05000	540.99
1712	0.01000	1363.64	1.31617	1363.64	0.02627	550.32	0.05000	540.89
1713	0.01000	1344.72	1.28532	1344.72	0.02671	550.33	0.05000	540.56
1718	0.01015	1417.77	1.34669	1417.77	0.03126	550.33	0.05000	540.39
1719	0.01006	1391.43	1.31802	1391.42	0.03006	550.32	0.05000	540.59
1720	0.01000	1366.23	1.28559	1366.23	0.02963	550.32	0.05000	540.53
1721	0.01000	1346.91	1.25275	1346.91	0.03022	550.33	0.05000	540.17
1726	0.01015	1417.77	1.33175	1417.77	0.03287	550.33	0.05000	540.18
1727	0.01006	1391.45	1.29233	1391.45	0.03258	550.32	0.05000	540.46
1728	0.01000	1366.83	1.25470	1366.83	0.03277	550.32	0.05000	540.43
1729	0.01000	1347.74	1.22103	1347.74	0.03350	550.33	0.05000	540.15
1734	0.01015	1417.77	1.31879	1417.77	0.03379	550.33	0.05000	540.26
1735	0.01005	1388.82	1.26593	1388.82	0.03482	550.32	0.05000	540.59
1736	0.01000	1365.51	1.22338	1365.51	0.03573	550.32	0.05000	540.56
1737	0.01000	1347.26	1.19037	1347.26	0.03652	550.33	0.05000	540.15
1742	0.01014	1412.14	1.30766	1412.14	0.03402	550.33	0.05000	540.65
1743	0.01005	1387.53	1.24713	1387.53	0.03652	550.32	0.05000	540.98
1744	0.01000	1365.14	1.19688	1365.14	0.03837	550.32	0.05000	540.99
1745	0.01000	1347.28	1.16361	1347.28	0.03924	550.33	0.05000	540.61
1750	0.01013	1402.93	1.29855	1402.93	0.03354	550.33	0.05000	541.34
1751	0.01006	1383.50	1.23147	1383.50	0.03752	550.32	0.05000	541.63
1752	0.01000	1362.89	1.17133	1362.89	0.04067	550.32	0.05000	541.66
1753	0.01000	1346.08	1.13763	1346.08	0.04175	550.33	0.05000	541.33
1758	0.01011	1390.17	1.29152	1390.17	0.03233	550.33	0.05000	542.35
1759	0.01005	1376.43	1.22007	1376.43	0.03767	550.33	0.05000	542.56
1760	0.01000	1358.64	1.14693	1358.64	0.04261	550.32	0.05000	542.60
1761	0.01000	1343.60	1.11230	1343.60	0.04405	550.33	0.05000	542.32
1766	0.01010	1377.15	1.28732	1377.15	0.03082	550.33	0.05000	543.39
1767	0.01005	1367.15	1.20803	1367.15	0.03757	550.33	0.05000	543.53
1768	0.01000	1353.02	1.12570	1353.02	0.04405	550.33	0.05000	543.54
1769	0.01000	1340.31	1.09184	1340.31	0.04575	550.33	0.05000	543.31
1774	0.01008	1365.45	1.28501	1365.45	0.02933	550.33	0.05000	544.34
1775	0.01004	1357.73	1.19099	1357.73	0.03798	550.33	0.05000	544.42
1776	0.01000	1347.24	1.10669	1347.24	0.04524	550.33	0.05000	544.38
1777	0.01000	1336.88	1.07625	1336.88	0.04694	550.33	0.05000	544.18
1782	0.01006	1352.33	1.28352	1352.33	0.02755	550.33	0.05000	545.41
1783	0.01003	1347.73	1.17474	1347.73	0.03824	550.33	0.05000	545.41
1784	0.01000	1340.98	1.08820	1340.98	0.04632	550.33	0.05000	545.33
1785	0.01000	1333.07	1.06123	1333.07	0.04803	550.33	0.05000	545.17
1790	0.01004	1337.78	1.28286	1337.78	0.02548	550.33	0.05000	546.61
1791	0.01002	1337.07	1.15959	1337.07	0.03831	550.33	0.05000	546.51
1792	0.01000	1334.20	1.07032	1334.20	0.04729	550.33	0.05000	546.38

1793	0.01000	1328.87	1.04673	1328.87	0.04903	550.33	0.05000	546.27
1798	0.01002	1321.96	1.28302	1321.96	0.02315	550.33	0.05000	547.91
1799	0.01001	1325.89	1.14532	1325.89	0.03823	550.33	0.05000	547.68
1800	0.01000	1327.02	1.05298	1327.02	0.04815	550.33	0.05000	547.51
1801	0.01000	1324.31	1.03312	1324.31	0.04990	550.33	0.05000	547.43
1806	0.01000	1305.28	1.28395	1305.28	0.02062	550.33	0.05000	549.30
1807	0.01000	1315.06	1.11718	1315.06	0.03968	550.33	0.05000	548.90
1808	0.01000	1319.65	1.03009	1319.65	0.04959	550.33	0.05000	548.70
1809	0.01000	1318.97	1.02402	1318.97	0.05020	550.33	0.05000	548.71
1814	0.01000	1315.51	1.50502	1315.50	0.00118	550.33	0.05000	550.00
1815	0.01000	1310.17	1.50048	1310.16	0.00117	550.33	0.05000	548.64
1816	0.01000	1306.46	1.49693	1306.46	0.00115	550.33	0.05000	548.07
1817	0.01000	1304.32	1.49431	1304.32	0.00115	550.33	0.05000	548.26
1822	0.01002	1329.45	1.48922	1329.45	0.00472	550.33	0.05000	548.74
1823	0.01001	1320.57	1.48491	1320.57	0.00409	550.33	0.05000	547.59
1824	0.01000	1313.79	1.47942	1313.79	0.00379	550.33	0.05000	547.05
1825	0.01000	1309.51	1.47303	1309.51	0.00386	550.33	0.05000	547.15
1830	0.01004	1342.40	1.47401	1342.40	0.00806	550.33	0.05000	547.56
1831	0.01001	1330.72	1.46976	1330.72	0.00694	550.33	0.05000	546.63
1832	0.01000	1320.90	1.46240	1320.90	0.00636	550.33	0.05000	546.11
1833	0.01000	1314.48	1.45254	1314.48	0.00648	550.33	0.05000	546.13
1838	0.01006	1354.34	1.45939	1354.34	0.01119	550.33	0.05000	546.47
1839	0.01002	1340.77	1.45507	1340.77	0.00974	550.33	0.05000	545.74
1840	0.01000	1327.96	1.44597	1327.96	0.00888	550.33	0.05000	545.25
1841	0.01000	1319.31	1.43290	1319.31	0.00900	550.33	0.05000	545.19
1846	0.01007	1365.28	1.44535	1365.28	0.01412	550.33	0.05000	545.47
1847	0.01003	1350.81	1.44090	1350.81	0.01250	550.33	0.05000	544.93
1848	0.01000	1335.07	1.43019	1335.07	0.01134	550.33	0.05000	544.47
1849	0.01000	1324.10	1.41422	1324.10	0.01143	550.33	0.05000	544.33

```
 TOTAL NUMBER OF DESIGN VARIABLES =   36
 TOTAL NUMBER OF CONSTRAINS       = 1228
 TOTAL NUMBER OF TEMP. CONSTRAINS =  468
 TOTAL NUMBER OF TEMP. PRINTOUTS  =   13
```

```
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
    X   0.1079E+04
   1.0 B         B         B
       |                             B
       |                                       B         B         B
       |                                                           B
       |                                                                     B         B         B
       D         D         D                                                                     A         B
       |                             D         D
       |                                                 D         D                                       A
       |                                                           D         D
       |                                                                     D         D         D
   0.0 +-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+
       |
       |
       |
       |
       |
       |
       |
       |
       |
       |
  -1.0 +
       .08         .18         .28         .38         .48         .58         .68         .78         .88         .98        1.08
                                                          TIME  ( X 1.401E-44 )
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```
              MAXIMUM TEMPERATURE OF EVERY LAYER
LAYER:        1        2        3        4
Tmax:   2300.33  2300.33   550.33   600.33
Optv:   1078.62  1078.62   550.24   550.24

                   VALUES OF DESIGN VARIABLES :
LAYER    DEV01    DEV02    DEV03    DEV04    DEV05    DEV06    DEV07    DEV08    DEV09
    1  0.01000  0.01000  0.01000  0.01000  0.01000  0.01000  0.01000  0.01000  0.01000
    2  1.15141  1.14778  1.14150  1.14414  1.10277  1.00039  1.11534  1.12092  1.11129
    3  0.03401  0.03505  0.03595  0.03382  0.03217  0.04152  0.03276  0.03198  0.03189
    4  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000

 THE ORIGINAL OBJECTIVE FUNCTION =     308.7402344

 THE RATIO OF OPTIMAL OBJECTIVE FUNCTION =   0.4178517

 THE TOTAL OPTIMAL WEIGHT = 2.50893306E+04
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MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
    X   0.4379E+01
   1.0 +                   A
       |
       |
       |                                                 A                               A                               A
       |
       |
       |
       |
       |
       |
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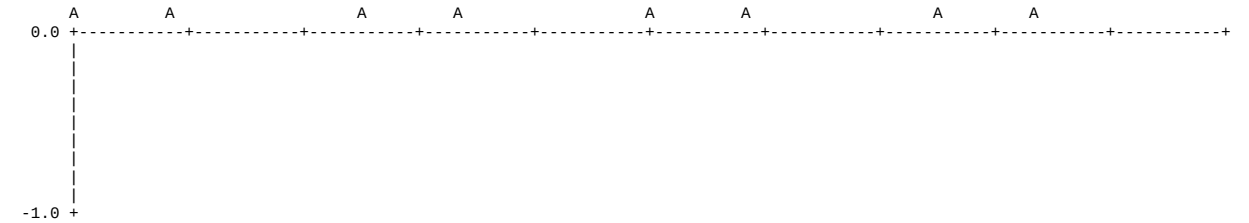


OPTIMAL STRUCTURES OF TPS FOR PATCH = 14
(WITH AVERAGE THICKNESS)

HRSI COAT	thin skin	0.01000 in.	1078.6 F
LI-900 (P)	slab	1.11506 in.	1078.6 F
RTV-560	thin skin	0.03435 in.	550.2 F
17 LB SIP .16 IN	slab	0.05000 in.	550.2 F

THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH = 14

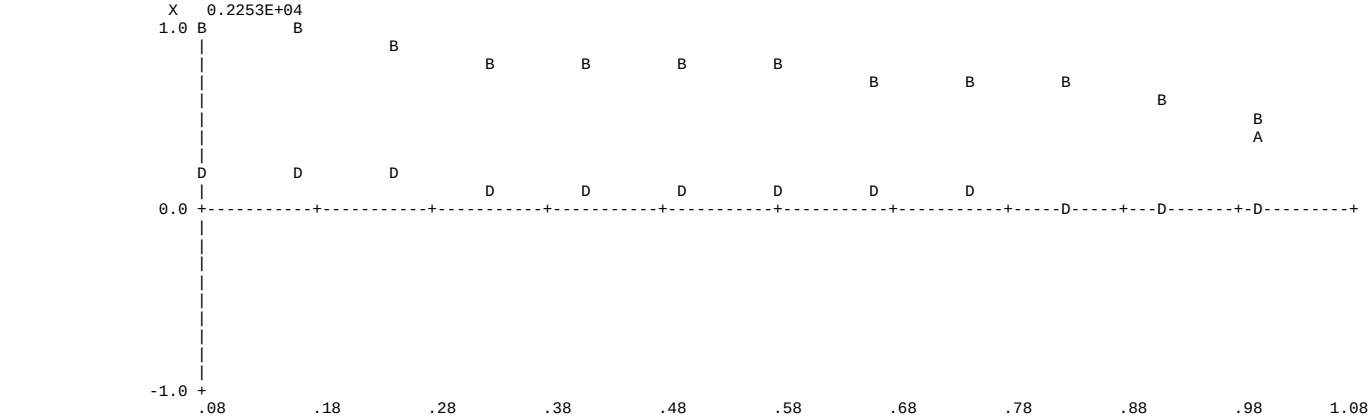
PANEL	LAYER01		LAYER02		LAYER03		LAYER04	
1933	0.01000	1078.44	1.14218	1078.44	0.03586	550.33	0.05000	550.23
1690	0.01000	1064.50	1.12721	1064.50	0.03321	550.33	0.05000	550.10
1691	0.01000	1052.78	1.13631	1052.78	0.03037	550.33	0.05000	550.11
1692	0.01000	1044.04	1.10850	1044.04	0.03138	550.32	0.05000	549.88
1693	0.01000	1042.57	1.03966	1040.71	0.03703	550.33	0.05000	549.39
1698	0.01000	1067.10	1.13072	1067.10	0.03334	550.33	0.05000	550.10
1699	0.01000	1052.77	1.14027	1052.77	0.02994	550.32	0.05000	550.13
1700	0.01000	1042.57	1.10561	1042.45	0.03133	550.32	0.05000	549.86
1701	0.01000	1042.57	1.02287	1039.12	0.03836	550.33	0.05000	549.29
1706	0.01000	1069.34	1.13395	1069.34	0.03346	550.33	0.05000	550.11
1707	0.01000	1052.94	1.14369	1052.94	0.02963	550.32	0.05000	550.14
1708	0.01000	1042.57	1.10346	1041.51	0.03135	550.32	0.05000	549.85
1709	0.01000	1042.57	1.01014	1038.29	0.03946	550.33	0.05000	549.21
1714	0.01000	1071.20	1.13691	1071.20	0.03356	550.33	0.05000	550.12
1715	0.01000	1053.27	1.14654	1053.27	0.02944	550.32	0.05000	550.15
1716	0.01000	1042.57	1.10207	1041.24	0.03144	550.32	0.05000	549.84
1717	0.01000	1042.57	1.00147	1038.22	0.04033	550.33	0.05000	549.19
1722	0.01000	1072.68	1.13960	1072.68	0.03366	550.33	0.05000	550.13
1723	0.01000	1053.76	1.14879	1053.76	0.02936	550.32	0.05000	550.16
1724	0.01000	1042.57	1.10144	1041.64	0.03161	550.32	0.05000	549.83
1725	0.01000	1042.57	0.99690	1038.91	0.04097	550.33	0.05000	549.19
1730	0.01000	1073.79	1.14201	1073.79	0.03374	550.33	0.05000	550.13
1731	0.01000	1054.42	1.15043	1054.42	0.02939	550.32	0.05000	550.17
1732	0.01000	1042.71	1.10164	1042.71	0.03186	550.32	0.05000	549.84
1733	0.01000	1042.57	0.99652	1040.36	0.04137	550.33	0.05000	549.19
1738	0.01000	1074.53	1.14414	1074.53	0.03382	550.33	0.05000	550.14
1739	0.01000	1055.30	1.15145	1055.30	0.02956	550.32	0.05000	550.17
1740	0.01000	1044.47	1.10275	1044.47	0.03217	550.32	0.05000	549.85
1741	0.01000	1042.57	1.00039	1042.57	0.04152	550.33	0.05000	549.19
1746	0.01000	1074.90	1.14602	1074.90	0.03388	550.33	0.05000	550.15
1747	0.01000	1057.32	1.15311	1057.32	0.02991	550.32	0.05000	550.18
1748	0.01000	1047.13	1.10738	1047.13	0.03233	550.32	0.05000	549.88
1749	0.01000	1045.52	1.00902	1045.52	0.04137	550.33	0.05000	549.26
1754	0.01000	1074.89	1.14761	1074.89	0.03393	550.33	0.05000	550.16
1755	0.01000	1059.55	1.15422	1059.55	0.03038	550.32	0.05000	550.18
1756	0.01000	1050.45	1.11288	1050.45	0.03256	550.32	0.05000	549.92
1757	0.01000	1049.23	1.02177	1049.23	0.04098	550.33	0.05000	549.36
1762	0.01000	1074.50	1.14893	1074.50	0.03397	550.33	0.05000	550.17
1763	0.01000	1061.96	1.15477	1061.96	0.03097	550.32	0.05000	550.18
1764	0.01000	1054.42	1.11922	1054.42	0.03286	550.32	0.05000	549.96
1765	0.01000	1053.69	1.03880	1053.69	0.04034	550.33	0.05000	549.49
1770	0.01000	1073.90	1.14980	1073.90	0.03399	550.33	0.05000	550.18
1771	0.01000	1064.02	1.15476	1064.02	0.03153	550.32	0.05000	550.18
1772	0.01000	1058.14	1.12507	1058.14	0.03315	550.32	0.05000	550.00
1773	0.01000	1057.86	1.05600	1057.86	0.03961	550.33	0.05000	549.61
1778	0.01000	1073.27	1.15034	1073.27	0.03400	550.33	0.05000	550.18
1779	0.01000	1065.65	1.15447	1065.65	0.03201	550.33	0.05000	550.18
1780	0.01000	1061.27	1.12987	1061.27	0.03340	550.33	0.05000	550.03
1781	0.01000	1061.40	1.07103	1061.40	0.03895	550.33	0.05000	549.72
1786	0.01000	1072.49	1.15078	1072.49	0.03401	550.33	0.05000	550.19
1787	0.01000	1067.35	1.15397	1067.35	0.03254	550.33	0.05000	550.18
1788	0.01000	1064.62	1.13455	1064.62	0.03372	550.33	0.05000	550.06
1789	0.01000	1065.23	1.08699	1065.23	0.03826	550.33	0.05000	549.84
1794	0.01000	1071.56	1.15110	1071.56	0.03402	550.33	0.05000	550.20
1795	0.01000	1069.10	1.15325	1069.10	0.03311	550.33	0.05000	550.17
1796	0.01000	1068.17	1.13913	1068.17	0.03409	550.33	0.05000	550.10
1797	0.01000	1069.37	1.10398	1069.37	0.03754	550.33	0.05000	549.96
1802	0.01000	1070.51	1.15131	1070.51	0.03402	550.33	0.05000	550.20
1803	0.01000	1070.86	1.15231	1070.86	0.03371	550.33	0.05000	550.16
1804	0.01000	1071.89	1.14362	1071.89	0.03451	550.33	0.05000	550.13

1805	0.01000	1073.78	1.12221	1073.78	0.03675	550.33	0.05000	550.10
1810	0.01000	1069.31	1.15141	1069.31	0.03401	550.33	0.05000	550.21
1811	0.01000	1073.10	1.15096	1073.10	0.03442	550.33	0.05000	550.15
1812	0.01000	1076.18	1.14778	1076.18	0.03505	550.33	0.05000	550.16
1813	0.01000	1078.62	1.14150	1078.62	0.03595	550.33	0.05000	550.24
1818	0.01000	1054.71	1.11534	1054.71	0.03276	550.33	0.05000	550.08
1819	0.01000	1054.02	1.12217	1054.02	0.03227	550.33	0.05000	550.04
1820	0.01000	1052.38	1.12092	1052.38	0.03198	550.33	0.05000	549.97
1821	0.01000	1049.73	1.11129	1049.73	0.03189	550.33	0.05000	549.86
1826	0.01000	1056.76	1.11771	1056.76	0.03285	550.33	0.05000	550.08
1827	0.01000	1053.49	1.12491	1053.49	0.03183	550.33	0.05000	550.06
1828	0.01000	1050.46	1.11811	1050.46	0.03184	550.33	0.05000	549.95
1829	0.01000	1047.61	1.09561	1047.61	0.03299	550.33	0.05000	549.75
1834	0.01000	1058.70	1.12000	1058.70	0.03294	550.33	0.05000	550.09
1835	0.01000	1053.16	1.12763	1053.16	0.03144	550.33	0.05000	550.07
1836	0.01000	1048.75	1.11596	1048.75	0.03168	550.33	0.05000	549.94
1837	0.01000	1045.69	1.08134	1045.69	0.03399	550.33	0.05000	549.66
1842	0.01000	1060.52	1.12220	1060.52	0.03302	550.33	0.05000	550.09
1843	0.01000	1053.00	1.13031	1053.00	0.03109	550.33	0.05000	550.08
1844	0.01000	1047.21	1.11398	1047.21	0.03154	550.33	0.05000	549.92
1845	0.01000	1043.97	1.06811	1043.97	0.03493	550.33	0.05000	549.58
1850	0.01000	1062.24	1.12432	1062.24	0.03310	550.33	0.05000	550.09
1851	0.01000	1052.90	1.13290	1052.90	0.03077	550.33	0.05000	550.10
1852	0.01000	1045.77	1.11161	1045.77	0.03145	550.33	0.05000	549.91
1853	0.01000	1042.57	1.05559	1042.47	0.03584	550.33	0.05000	549.49
1854	0.01000	1049.73	1.11129	1049.73	0.03189	550.33	0.05000	549.86
1855	0.01000	1052.40	1.12096	1052.40	0.03198	550.33	0.05000	549.97
1856	0.01000	1054.02	1.12217	1054.02	0.03227	550.33	0.05000	550.04
1857	0.01000	1054.71	1.11534	1054.71	0.03276	550.33	0.05000	550.08
1862	0.01000	1049.73	1.11129	1049.73	0.03189	550.33	0.05000	549.86
1863	0.01000	1052.45	1.12109	1052.45	0.03199	550.33	0.05000	549.97
1864	0.01000	1054.03	1.12214	1054.03	0.03227	550.33	0.05000	550.04
1865	0.01000	1054.71	1.11534	1054.71	0.03276	550.33	0.05000	550.08
1870	0.01000	1049.73	1.11129	1049.73	0.03189	550.33	0.05000	549.86
1871	0.01000	1052.38	1.12092	1052.38	0.03198	550.33	0.05000	549.97
1872	0.01000	1053.97	1.12229	1053.97	0.03225	550.33	0.05000	550.04
1873	0.01000	1054.70	1.11575	1054.70	0.03274	550.33	0.05000	550.08
1878	0.01000	1049.73	1.11129	1049.73	0.03189	550.33	0.05000	549.86
1879	0.01000	1052.38	1.12092	1052.38	0.03198	550.33	0.05000	549.97
1880	0.01000	1053.83	1.12251	1053.83	0.03221	550.33	0.05000	550.03
1881	0.01000	1054.68	1.11640	1054.68	0.03270	550.33	0.05000	550.08
1929	0.01000	1071.28	1.15153	1071.28	0.03419	550.33	0.05000	550.17
1930	0.01000	1073.61	1.15066	1073.61	0.03450	550.33	0.05000	550.15
1931	0.01000	1076.91	1.14640	1076.91	0.03527	550.33	0.05000	550.18

OPTIMIZATION SYSTEM FOR TPSSYM = 15

TOTAL NUMBER OF DESIGN VARIABLES = 36
TOTAL NUMBER OF CONSTRAINS = 956
TOTAL NUMBER OF TEMP. CONSTRAINS = 468
TOTAL NUMBER OF TEMP. PRINTOUTS = 13

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



MAXIMUM TEMPERATURE OF EVERY LAYER

LAYER:	1	2	3	4
Tmax:	2300.33	2300.33	550.33	600.33
Optv:	2252.56	2252.56	481.33	481.33

VALUES OF DESIGN VARIABLES :

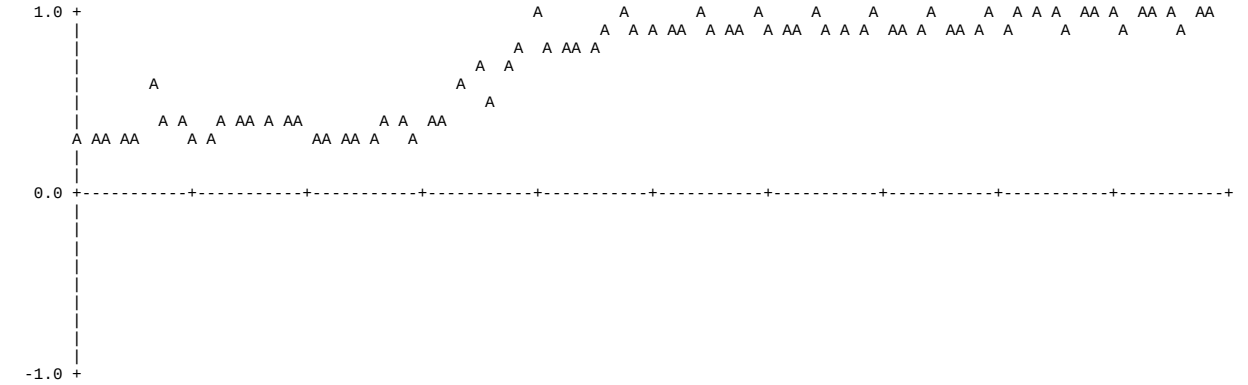
LAYER	DEV01	DEV02	DEV03	DEV04	DEV05	DEV06	DEV07	DEV08	DEV09
1	0.15588	0.30053	0.19904	0.39873	0.36375	0.26656	0.14822	0.34375	0.14274
2	2.43083	2.62965	2.86073	1.09518	1.09567	2.17544	1.03258	1.06641	1.00000
3	0.03969	0.14222	0.15485	0.01772	0.04890	0.04991	0.36959	0.07020	0.04679
4	0.06228	0.05000	0.05000	0.05000	0.06310	0.05000	0.09098	0.05000	0.05000

THE ORIGINAL OBJECTIVE FUNCTION = 207.8086090

THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 1.4997677

THE TOTAL OPTIMAL WEIGHT = 1.56195893E+05

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



OPTIMAL STRUCTURES OF TPS FOR PATCH = 15
(WITH AVERAGE THICKNESS)

HRSI COAT	thin skin	0.25769 in.	2252.6 F
LI-900 (P)	slab	1.70962 in.	2252.6 F
RTV-560	thin skin	0.10443 in.	481.3 F
17 LB SIP .16 IN	slab	0.05737 in.	481.3 F

THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH = 15

PANEL	LAYER01		LAYER02		LAYER03		LAYER04	
45	0.18922	1799.19	2.27791	1799.19	0.02971	524.63	0.05999	458.37
46	0.27327	1879.69	2.35081	1879.69	0.09060	546.32	0.05519	352.22
47	0.30786	1968.65	2.45540	1968.65	0.13056	550.33	0.05180	283.36
48	0.28624	2093.86	2.62519	2093.86	0.14974	550.33	0.04986	253.02
49	0.21129	2217.66	2.80634	2217.66	0.14405	550.33	0.04998	270.80
55	0.15588	1985.38	2.43083	1985.38	0.03969	550.33	0.06228	481.33
56	0.25928	2038.47	2.52628	2038.47	0.10233	550.33	0.05459	342.29
57	0.30053	2100.66	2.62965	2100.66	0.14222	550.33	0.05000	258.54
58	0.27996	2172.61	2.74200	2172.61	0.15973	550.33	0.04848	229.31
59	0.19904	2252.56	2.86073	2252.56	0.15485	550.33	0.05000	254.33
85	0.37930	624.85	1.26087	624.85	0.00603	377.34	0.04982	296.67
86	0.37864	737.78	1.13175	737.78	0.03730	491.09	0.05872	365.78
87	0.35911	981.73	1.25476	981.73	0.05784	550.33	0.06212	407.74
88	0.32298	1322.31	1.60863	1322.31	0.06475	550.33	0.05958	418.16
89	0.26847	1807.92	2.24368	1807.92	0.06196	550.33	0.05081	393.92
95	0.34715	853.22	1.47114	853.22	0.00129	402.46	0.05079	332.13
96	0.36010	968.28	1.37247	968.28	0.04312	506.97	0.05780	369.99
97	0.34997	1187.35	1.48652	1187.35	0.07099	550.33	0.06046	391.72
98	0.31867	1482.43	1.79726	1482.43	0.08146	550.33	0.05836	394.52
99	0.26452	1896.70	2.35298	1896.70	0.07793	550.33	0.05108	374.18
105	0.30132	1145.17	1.72769	1145.17	0.00442	438.04	0.05302	373.51
106	0.33407	1254.87	1.67662	1254.87	0.05466	522.30	0.05688	369.38
107	0.33730	1438.22	1.78501	1438.22	0.08862	550.33	0.05802	363.93
108	0.31039	1682.41	2.05188	1682.41	0.10249	550.33	0.05611	356.62
109	0.25320	2010.37	2.50438	2010.37	0.09827	550.33	0.05078	343.98
115	0.24114	1502.96	2.03169	1502.96	0.01602	484.57	0.05659	420.90
116	0.30046	1600.45	2.04750	1600.45	0.07290	536.94	0.05595	362.71
117	0.32102	1735.91	2.15554	1735.91	0.11140	550.33	0.05469	322.04
118	0.29770	1918.38	2.37309	1918.38	0.12868	550.33	0.05276	301.47
119	0.23201	2137.35	2.68545	2137.35	0.12369	550.33	0.05020	303.08
125	0.14822	914.09	1.03258	914.09	0.36959	548.44	0.09098	182.79
126	0.29690	422.61	1.06234	422.61	0.18416	267.62	0.06519	117.88
127	0.34375	219.35	1.06641	219.35	0.07020	168.61	0.05000	117.88
128	0.29050	297.68	1.04504	297.68	0.02454	247.92	0.04498	198.16
129	0.14274	644.88	1.00000	644.88	0.04679	496.25	0.05000	347.61
135	0.22588	658.97	0.90611	658.97	0.29385	489.84	0.08115	177.99
136	0.32397	321.00	0.87874	321.00	0.15653	313.65	0.06572	165.25
137	0.35588	219.35	0.90019	212.01	0.06002	251.88	0.05486	196.53
138	0.31132	368.48	0.99910	368.48	0.02050	308.84	0.04968	261.52
139	0.19634	794.11	1.18083	794.11	0.03154	484.99	0.04975	366.26

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    145   0.29277    456.67   0.81963    456.67   0.22349    439.48   0.07223    178.62
    146   0.35259    237.76   0.74015    237.76   0.12434    349.13   0.06494    211.76
    147   0.36612    227.71   0.78202    246.06   0.05002    326.01   0.05852    264.41
    148   0.32490    457.76   0.96868    457.76   0.01897    375.60   0.05404    322.82
    149   0.23117    937.92   1.32132    937.92   0.02446    494.18   0.05054    389.34
    155   0.34558    319.77   0.78071    319.77   0.16122    399.88   0.06462    185.33
    156   0.37655    219.35   0.66455    224.87   0.09353    377.27   0.06356    251.79
    157   0.37319    277.77   0.72469    299.02   0.04187    390.31   0.06107    320.27
    158   0.33212    569.68   0.98123    569.68   0.02029    436.23   0.05731    372.03
    159   0.25274   1088.92   1.45937   1088.92   0.02324    511.69   0.05141    409.31
    165   0.38232    254.82   0.79261    254.82   0.10899    372.54   0.05855    198.27
    166   0.39252    219.35   0.65351    250.49   0.06767    403.13   0.06217    287.37
    167   0.37615    368.48   0.73381    368.48   0.03715    444.92   0.06268    363.50
    168   0.33424    710.76   1.04903    710.76   0.02461    487.67   0.05940    407.38
    169   0.26475   1252.62   1.61667   1252.62   0.02627    529.36   0.05183    421.58
    175   0.40251    261.60   0.85382    261.60   0.06778    357.81   0.05414    216.97
    176   0.39912    288.40   0.70451    303.59   0.04933    429.59   0.06113    318.79
    177   0.37489    498.72   0.80702    498.72   0.03687    489.99   0.06348    393.69
    178   0.33237    879.58   1.17311    879.58   0.03205    528.16   0.06035    428.03
    179   0.26983   1425.97   1.79845   1425.97   0.03236    542.33   0.05159    424.16
    185   0.40719    333.25   0.95814    333.25   0.03764    354.90   0.05135    240.41
    186   0.39713    416.01   0.81113    416.01   0.03942    456.40   0.06043    344.41
    187   0.37031    658.79   0.93357    658.79   0.04110    525.20   0.06359    410.69
    188   0.32772   1065.42   1.34202   1065.42   0.04236    550.33   0.06031    434.22
    189   0.26996   1596.49   1.99260   1596.49   0.04055    548.92   0.05087    417.66
    195   0.39873    456.85   1.09518    456.85   0.01772    361.95   0.05000    267.06
    196   0.38928    574.14   0.95515    574.14   0.03703    480.20   0.05991    361.68
    197   0.36376    832.95   1.09576    832.95   0.04890    550.33   0.06310    415.41
    198   0.32247   1224.79   1.50574   1224.79   0.05286    550.33   0.05971    429.49
    199   0.26656   1747.00   2.17544   1747.00   0.04991    550.33   0.05000    405.06

                  OPTIMIZATION SYSTEM FOR TPSSYM =    16


 TOTAL NUMBER OF DESIGN VARIABLES =   36
 TOTAL NUMBER OF CONSTRAINS       =  956
 TOTAL NUMBER OF TEMP. CONSTRAINS =  468
 TOTAL NUMBER OF TEMP. PRINTOUTS  =   13


MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
    X   0.1954E+04
   1.0 B         B         B
       |                             B
       |                                       B         B         B
       |                                                           B         B
       |                                                                     B         B
       |                                                                     A         B
       |
       D         D
       |                   D         D         D
       |                                                 D         D         D         D         D         D         D
   0.0 +-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+
       |
       |
       |
       |
       |
       |
       |
       |
       |
       |
  -1.0 +
       .08         .18         .28         .38         .48         .58         .68         .78         .88         .98       1.08
                                                              TIME  ( X 1.401E-44 )


              MAXIMUM TEMPERATURE OF EVERY LAYER
LAYER:        1        2        3        4
Tmax:   2300.33  2300.33   550.33   600.33
Optv:   1954.13  1954.13   549.08   549.08

                  VALUES OF DESIGN VARIABLES :
LAYER    DEV01    DEV02    DEV03    DEV04    DEV05    DEV06    DEV07    DEV08    DEV09
    1  0.01000  0.01000  0.01000  0.01000  0.01000  0.01000  0.01000  0.01000  0.01000
    2  2.07346  2.21188  2.45880  1.33464  1.47211  1.65866  1.00000  1.03654  1.00000
    3  0.01795  0.02309  0.02259  0.02617  0.02759  0.02456  0.02791  0.06275  0.05444
    4  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000

 THE ORIGINAL OBJECTIVE FUNCTION =     207.8067322

 THE RATIO OF OPTIMAL OBJECTIVE FUNCTION =   0.5132689

 THE TOTAL OPTIMAL WEIGHT = 8.02899942E+04


MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
    X   0.1002E+01
   1.0 +       A
       |
       |     A   AA
       |
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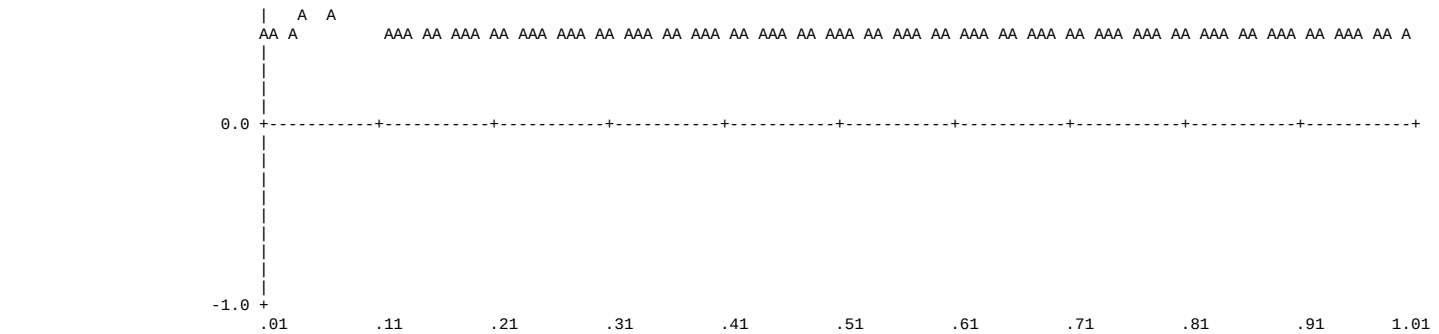


OPTIMAL STRUCTURES OF TPS FOR PATCH = 16
(WITH AVERAGE THICKNESS)

HRSI COAT	thin skin	0.01000 in.	1954.1 F
LI-900 (P)	slab	1.58290 in.	1954.1 F
RTV-560	thin skin	0.03190 in.	549.1 F
17 LB SIP .16 IN	slab	0.05000 in.	549.1 F

THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH = 16

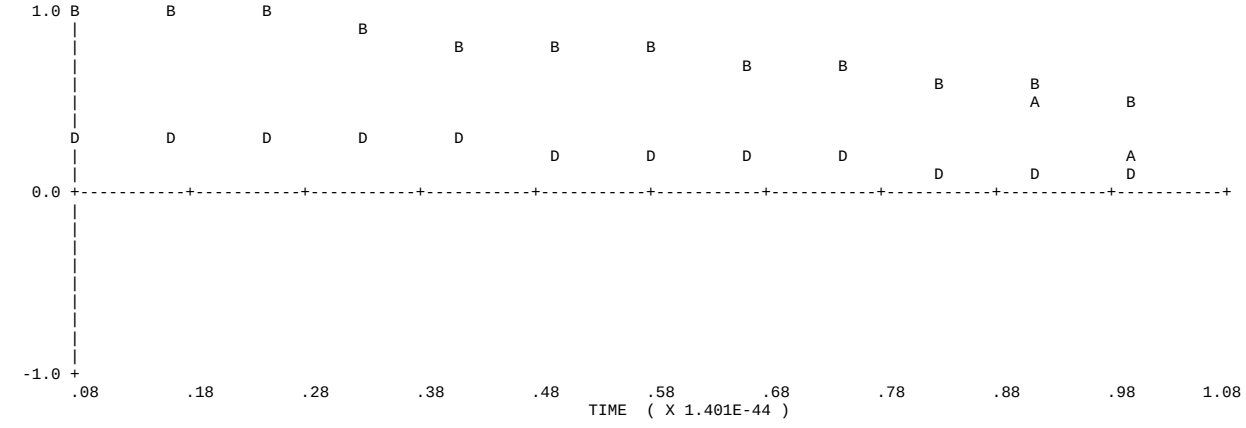
PANEL	LAYER01		LAYER02		LAYER03		LAYER04	
41	0.01000	1652.61	2.05246	1652.61	0.02151	550.33	0.05000	549.08
42	0.01000	1723.64	2.13130	1723.64	0.02284	550.33	0.05000	549.08
43	0.01000	1807.19	2.24238	1807.19	0.02309	550.33	0.05000	549.08
44	0.01000	1897.66	2.37642	1897.66	0.02222	550.33	0.05000	549.08
51	0.01000	1698.07	2.13041	1698.07	0.02134	550.33	0.05000	548.52
52	0.01000	1772.77	2.21188	1772.77	0.02309	550.33	0.05000	547.89
53	0.01000	1858.27	2.32154	1858.27	0.02350	550.33	0.05000	547.14
54	0.01000	1954.13	2.45880	1954.13	0.02259	550.33	0.05000	546.28
81	0.01000	1318.81	1.51230	1318.81	0.02560	550.33	0.05000	549.08
82	0.01000	1373.16	1.58584	1373.16	0.02550	550.33	0.05000	549.08
83	0.01000	1427.32	1.67422	1427.32	0.02470	550.33	0.05000	549.08
84	0.01000	1484.01	1.78149	1484.01	0.02315	550.33	0.05000	549.08
91	0.01000	1399.70	1.63584	1399.70	0.02410	550.33	0.05000	549.08
92	0.01000	1458.39	1.71189	1458.39	0.02401	550.33	0.05000	549.08
93	0.01000	1518.69	1.80606	1518.69	0.02336	550.33	0.05000	549.08
94	0.01000	1582.49	1.92113	1582.49	0.02215	550.33	0.05000	549.08
101	0.01000	1487.11	1.77546	1487.11	0.02289	550.33	0.05000	549.08
102	0.01000	1550.30	1.85319	1550.30	0.02308	550.33	0.05000	549.08
103	0.01000	1617.95	1.95324	1617.95	0.02267	550.33	0.05000	549.08
104	0.01000	1690.36	2.07570	1690.36	0.02168	550.33	0.05000	549.08
111	0.01000	1580.19	1.92958	1580.19	0.02197	550.33	0.05000	549.08
112	0.01000	1648.08	2.00854	1648.08	0.02272	550.33	0.05000	549.08
113	0.01000	1724.62	2.11513	1724.62	0.02266	550.33	0.05000	549.08
114	0.01000	1807.34	2.24495	1807.34	0.02179	550.33	0.05000	549.08
121	0.01000	831.93	1.02873	831.93	0.05173	550.33	0.05000	369.82
122	0.01000	852.67	1.03654	852.67	0.06275	550.33	0.05000	350.80
123	0.01000	874.63	1.02693	874.63	0.06364	550.33	0.05000	363.22
124	0.01000	897.77	1.00000	897.77	0.05444	550.33	0.05000	406.90
131	0.01000	866.12	1.02875	866.12	0.04731	550.33	0.05000	404.59
132	0.01000	891.66	1.04919	891.66	0.05612	550.33	0.05000	389.30
133	0.01000	915.92	1.05672	915.92	0.05672	550.33	0.05000	398.47
134	0.01000	941.17	1.05294	941.17	0.04907	550.33	0.05000	433.12
141	0.01000	910.67	1.04503	910.67	0.04297	550.33	0.05000	439.00
142	0.01000	940.78	1.07790	940.78	0.04961	550.33	0.05000	427.02
143	0.01000	968.43	1.10224	968.43	0.04978	550.33	0.05000	433.79
144	0.01000	996.01	1.12054	996.01	0.04356	550.33	0.05000	459.69
151	0.01000	965.17	1.08136	965.17	0.03893	550.33	0.05000	470.51
152	0.01000	999.83	1.12549	999.83	0.04355	550.33	0.05000	461.69
153	0.01000	1031.36	1.16535	1031.36	0.04330	550.33	0.05000	466.44
154	0.01000	1062.03	1.20413	1062.03	0.03830	550.33	0.05000	484.67
161	0.01000	1028.50	1.13878	1028.50	0.03529	550.33	0.05000	497.59
162	0.01000	1067.49	1.19237	1067.49	0.03820	550.33	0.05000	491.54
163	0.01000	1103.42	1.24624	1103.42	0.03761	550.33	0.05000	494.64
164	0.01000	1137.90	1.30333	1137.90	0.03362	550.33	0.05000	506.47
171	0.01000	1098.25	1.21513	1098.25	0.03214	550.33	0.05000	519.32
172	0.01000	1141.26	1.27614	1141.26	0.03373	550.33	0.05000	515.55
173	0.01000	1182.26	1.34265	1182.26	0.03289	550.33	0.05000	517.35
174	0.01000	1221.21	1.41559	1221.21	0.02972	550.33	0.05000	524.06
181	0.01000	1170.89	1.30519	1170.89	0.02952	550.33	0.05000	535.49
182	0.01000	1217.62	1.37168	1217.62	0.03021	550.33	0.05000	533.45
183	0.01000	1264.54	1.44986	1264.54	0.02922	550.33	0.05000	534.27
184	0.01000	1308.54	1.53615	1308.54	0.02672	550.33	0.05000	537.09
191	0.01000	1240.60	1.39923	1240.60	0.02749	550.33	0.05000	546.33
192	0.01000	1292.57	1.47211	1292.57	0.02759	550.33	0.05000	545.73
193	0.01000	1344.48	1.55886	1344.48	0.02661	550.33	0.05000	545.62

194	0.01000	1395.79	1.65866	1395.79	0.02456	550.33	0.05000	545.89
309	0.01000	1183.15	1.33464	1183.15	0.02617	550.33	0.05000	547.41
310	0.01000	1116.29	1.24131	1116.29	0.02709	550.33	0.05000	539.81
311	0.01000	1048.65	1.15513	1048.65	0.02787	550.33	0.05000	528.66
312	0.01000	984.29	1.08354	984.29	0.02842	550.33	0.05000	513.66
313	0.01000	926.66	1.03181	926.66	0.02868	550.33	0.05000	495.04
314	0.01000	878.07	1.00197	878.07	0.02866	550.33	0.05000	473.55
315	0.01000	839.46	0.99272	839.46	0.02838	550.33	0.05000	450.39
316	0.01000	810.57	1.00000	810.57	0.02791	550.33	0.05000	427.09
317	0.01000	1511.64	1.86526	1511.64	0.02036	550.33	0.05000	549.08
329	0.01000	1422.77	1.71288	1422.77	0.02210	550.33	0.05000	549.08
341	0.01000	1338.26	1.57325	1338.26	0.02365	550.33	0.05000	549.08
353	0.01000	1260.31	1.45005	1260.31	0.02498	550.33	0.05000	549.08
389	0.01000	1628.91	2.07346	1628.91	0.01795	550.33	0.05000	549.08
401	0.01000	1581.67	1.98870	1581.67	0.01894	550.33	0.05000	549.08

OPTIMIZATION SYSTEM FOR TPSSYM = 17

TOTAL NUMBER OF DESIGN VARIABLES = 36
TOTAL NUMBER OF CONSTRAINS = 956
TOTAL NUMBER OF TEMP. CONSTRAINS = 468
TOTAL NUMBER OF TEMP. PRINTOUTS = 13

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



MAXIMUM TEMPERATURE OF EVERY LAYER

LAYER:	1	2	3	4
Tmax:	2300.33	2300.33	550.33	600.33
Optv:	1586.86	1586.86	550.23	550.23

VALUES OF DESIGN VARIABLES :

LAYER	DEV01	DEV02	DEV03	DEV04	DEV05	DEV06	DEV07	DEV08	DEV09
1	0.01069	0.01000	0.01038	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000
2	1.77636	1.84544	1.98148	1.00046	1.18568	1.23522	1.00000	1.00000	1.00000
3	0.02600	0.02648	0.02124	0.04017	0.02877	0.03279	0.00100	0.00100	0.00100
4	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000

THE ORIGINAL OBJECTIVE FUNCTION = 207.8066864

THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.4270920

THE TOTAL OPTIMAL WEIGHT = 8.43256413E+04

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES

```
     |
-1.0 +
     .01         .11         .21         .31         .41         .51         .61         .71         .81         .91       1.01
                                                              TIME  ( X 1.261E-43 )
```

OPTIMAL STRUCTURES OF TPS FOR PATCH = 17
(WITH AVERAGE THICKNESS)

HRSI COAT	thin skin	0.01012 in.	1586.9 F
LI-900 (P)	slab	1.33607 in.	1586.9 F
RTV-560	thin skin	0.01983 in.	550.2 F
17 LB SIP .16 IN	slab	0.05000 in.	550.2 F

THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH = 17

PANEL	LAYER01		LAYER02		LAYER03		LAYER04	
269	0.01000	1060.87	1.00046	1060.87	0.04017	550.33	0.05000	549.63
270	0.00993	1002.66	0.92176	1002.66	0.03921	550.33	0.05000	546.97
271	0.00988	945.62	0.86153	945.62	0.03674	550.33	0.05000	543.03
272	0.00985	893.73	0.82884	893.73	0.03249	550.33	0.05000	537.70
273	0.00985	850.12	0.82879	850.12	0.02643	550.33	0.05000	531.06
274	0.00988	816.49	0.86135	816.49	0.01880	550.33	0.05000	523.37
275	0.00993	793.10	0.92146	793.10	0.01010	550.33	0.05000	515.06
276	0.01000	778.87	1.00000	778.87	0.00100	550.33	0.05000	506.70
277	0.01000	1083.38	1.10994	1083.38	0.03255	550.33	0.05000	549.73
278	0.00998	1024.92	1.03269	1024.92	0.03123	550.33	0.05000	548.02
279	0.00996	967.46	0.96878	967.46	0.02882	550.33	0.05000	545.46
280	0.00995	914.96	0.92609	914.96	0.02515	550.33	0.05000	542.00
281	0.00995	870.57	0.90933	870.57	0.02026	550.33	0.05000	537.68
282	0.00996	836.00	0.91903	836.00	0.01433	550.33	0.05000	532.70
283	0.00998	811.56	0.95156	811.56	0.00774	550.33	0.05000	527.36
284	0.01000	796.24	1.00000	796.24	0.00100	550.33	0.05000	522.04
285	0.01000	1108.67	1.18568	1108.67	0.02877	550.33	0.05000	549.88
286	0.01000	1049.15	1.10778	1049.15	0.02731	550.33	0.05000	548.64
287	0.01000	990.19	1.04002	990.19	0.02496	550.33	0.05000	546.80
288	0.01000	935.69	0.98957	935.69	0.02161	550.33	0.05000	544.30
289	0.01000	888.82	0.96100	888.82	0.01731	550.33	0.05000	541.17
290	0.01000	851.37	0.95536	851.37	0.01223	550.33	0.05000	537.54
291	0.01000	823.80	0.97015	823.80	0.00666	550.33	0.05000	533.64
292	0.01000	805.29	1.00000	805.29	0.00100	550.33	0.05000	529.72
293	0.01000	1136.67	1.22749	1136.67	0.02884	550.33	0.05000	550.05
294	0.01000	1075.19	1.14597	1075.19	0.02754	550.33	0.05000	548.82
295	0.00999	1013.53	1.07355	1013.53	0.02531	550.33	0.05000	546.99
296	0.00999	955.54	1.01740	955.54	0.02202	550.33	0.05000	544.49
297	0.00999	904.45	0.98226	904.45	0.01772	550.33	0.05000	541.36
298	0.00999	862.24	0.96949	862.24	0.01256	550.33	0.05000	537.71
299	0.00999	829.60	0.97704	829.60	0.00685	550.33	0.05000	533.76
300	0.01000	806.03	1.00000	806.03	0.00100	550.33	0.05000	529.75
301	0.01000	1167.36	1.23522	1167.36	0.03279	550.33	0.05000	550.23
302	0.00996	1102.96	1.14712	1102.96	0.03193	550.33	0.05000	548.53
303	0.00993	1037.38	1.06932	1037.38	0.02985	550.33	0.05000	545.99
304	0.00992	974.45	1.00962	974.45	0.02637	550.33	0.05000	542.55
305	0.00992	917.46	0.97321	917.46	0.02147	550.33	0.05000	538.23
306	0.00993	868.63	0.96152	868.63	0.01532	550.33	0.05000	533.19
307	0.00996	828.99	0.97225	828.99	0.00833	550.33	0.05000	527.71
308	0.01000	798.45	1.00000	798.45	0.00100	550.33	0.05000	522.14
318	0.01026	1474.27	1.76078	1474.27	0.02640	550.33	0.05000	550.23
319	0.01004	1434.06	1.70128	1434.06	0.02733	550.33	0.05000	550.23
320	0.01000	1398.97	1.64135	1398.97	0.02863	550.33	0.05000	550.23
321	0.01015	1369.11	1.58034	1369.11	0.03041	550.33	0.05000	550.23
322	0.01046	1344.69	1.51827	1344.69	0.03269	550.33	0.05000	550.23
330	0.01018	1391.48	1.60672	1391.48	0.02935	550.33	0.05000	550.23
331	0.01003	1353.21	1.56315	1353.21	0.02866	550.33	0.05000	550.23
332	0.01000	1319.66	1.50768	1319.66	0.02955	550.33	0.05000	550.23
333	0.01010	1290.91	1.44011	1290.91	0.03206	550.33	0.05000	550.23
334	0.01032	1267.28	1.36167	1267.28	0.03612	550.33	0.05000	550.23
342	0.01011	1313.21	1.46840	1313.21	0.03140	550.33	0.05000	550.23
343	0.01002	1277.24	1.43884	1277.24	0.02937	550.33	0.05000	550.23
344	0.01000	1245.47	1.38795	1245.47	0.02990	550.33	0.05000	550.23
345	0.01006	1217.95	1.31584	1217.95	0.03300	550.33	0.05000	550.23
346	0.01020	1194.98	1.22421	1194.98	0.03853	550.33	0.05000	550.23
354	0.01005	1240.41	1.34744	1240.41	0.03255	550.33	0.05000	550.23
355	0.01001	1207.07	1.32981	1207.07	0.02946	550.33	0.05000	550.23
356	0.01000	1177.25	1.28354	1177.25	0.02968	550.33	0.05000	550.23
357	0.01003	1151.00	1.20891	1151.00	0.03319	550.33	0.05000	550.23
358	0.01010	1128.57	1.10738	1128.57	0.03989	550.33	0.05000	550.23
390	0.01038	1586.86	1.98148	1586.86	0.02124	550.33	0.05000	549.98
391	0.01006	1548.36	1.90509	1548.36	0.02458	550.33	0.05000	549.85
392	0.01000	1515.19	1.84544	1515.19	0.02648	550.33	0.05000	549.80
393	0.01021	1487.35	1.80253	1487.35	0.02695	550.33	0.05000	549.85
394	0.01069	1464.83	1.77636	1464.83	0.02600	550.33	0.05000	549.98
402	0.01033	1540.69	1.88950	1540.69	0.02351	550.33	0.05000	550.23
403	0.01005	1500.66	1.81892	1500.66	0.02584	550.33	0.05000	550.23
404	0.01000	1465.85	1.75775	1465.85	0.02750	550.33	0.05000	550.23
405	0.01018	1436.41	1.70555	1436.41	0.02856	550.33	0.05000	550.23
406	0.01059	1412.37	1.66167	1412.37	0.02910	550.33	0.05000	550.23

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                  OPTIMIZATION SYSTEM FOR TPSSYM =    18


 TOTAL NUMBER OF DESIGN VARIABLES =   36
 TOTAL NUMBER OF CONSTRAINS       =  956
 TOTAL NUMBER OF TEMP. CONSTRAINS =  468
 TOTAL NUMBER OF TEMP. PRINTOUTS  =   13


MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
    X   0.1433E+04
   1.0 B         B         B
       |                   B
       |                             B         B         B
       |                                                   B         B
       |                                                             B         B
       |                                                                       A         B
       D         D         D
       |                   D         D         D                                       A
       |                                       D         D         D
       |                                                             D         D         D
   0.0 +-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+
       |
       |
       |
       |
       |
       |
       |
       |
       |
  -1.0 +
       .08         .18         .28         .38         .48         .58         .68         .78         .88         .98       1.08
                                                              TIME  ( X 1.401E-44 )


              MAXIMUM TEMPERATURE OF EVERY LAYER
LAYER:        1         2         3         4
Tmax:   2300.33  2300.33   550.33   600.33
Optv:   1433.32  1433.32   550.32   550.32

                   VALUES OF DESIGN VARIABLES :
LAYER    DEV01    DEV02    DEV03    DEV04    DEV05    DEV06    DEV07    DEV08    DEV09
    1  0.01000  0.01000  0.01000  0.01000  0.01000  0.01000  0.01000  0.01000  0.01000
    2  1.69554  1.63332  1.74265  1.00012  1.00025  1.00031  1.00000  1.00000  1.00000
    3  0.01741  0.03083  0.02665  0.02601  0.03082  0.03539  0.00100  0.00100  0.00100
    4  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000

 THE ORIGINAL OBJECTIVE FUNCTION =     207.8066864

 THE RATIO OF OPTIMAL OBJECTIVE FUNCTION =   0.3924053

 THE TOTAL OPTIMAL WEIGHT = 8.28762920E+04


MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
    X   0.5887E+00
   1.0 + A  A   A
       |   A  A
       |          A A A
       A               A A A A AA A A A A AA A A A AA A A A A AA A A A AA A A A A AA A A A AA A A A A AA A A A AA A A A A AA A
       |
       |
       |
       |
       |
       |
   0.0 +-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+
       |
       |
       |
       |
       |
       |
       |
       |
       |
  -1.0 +
       .02         .12         .22         .32         .42         .52         .62         .72         .82         .92       1.02
                                                              TIME  ( X 9.809E-44 )


              OPTIMAL STRUCTURES OF TPS FOR PATCH =      18
                    (WITH AVERAGE THICKNESS)
 ============================================================   -----
                      HRSI COAT           thin skin            0.01000 in.  1433.3 F
 ============================================================   -----
                                                                 i
                      LI-900 (P)          slab                 1.23024 in.  1433.3 F
                                                                 i
 ============================================================   -----
                      RTV-560             thin skin            0.01890 in.   550.3 F
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 ============================================================   -----
                                                                  i
                      17 LB SIP .16 IN     slab                 0.05000 in.   550.3 F
                                                                  i
 ============================================================   -----
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THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH = 18

PANEL	LAYER01		LAYER02		LAYER03		LAYER04	
229	0.01000	975.95	1.00012	975.95	0.02601	550.33	0.05000	550.02
230	0.01000	921.32	0.92733	921.32	0.02540	550.33	0.05000	544.16
231	0.01000	867.41	0.87166	867.41	0.02382	550.33	0.05000	535.39
232	0.01000	817.88	0.84148	817.88	0.02110	550.33	0.05000	523.48
233	0.01000	775.65	0.84148	775.65	0.01724	550.33	0.05000	508.58
234	0.01000	742.34	0.87162	742.34	0.01237	550.33	0.05000	491.26
235	0.01000	718.30	0.92728	718.30	0.00681	550.33	0.05000	472.52
236	0.01000	702.73	1.00000	702.73	0.00100	550.33	0.05000	453.62
237	0.01000	990.25	1.00009	990.25	0.02846	550.33	0.05000	549.98
238	0.01000	934.57	0.93322	934.57	0.02700	550.33	0.05000	544.73
239	0.01000	879.87	0.88201	879.87	0.02468	550.33	0.05000	536.87
240	0.01000	829.92	0.85423	829.92	0.02138	550.33	0.05000	526.18
241	0.01000	787.71	0.85423	787.71	0.01714	550.33	0.05000	512.82
242	0.01000	754.85	0.88198	754.85	0.01212	550.33	0.05000	497.32
243	0.01000	731.66	0.93319	731.66	0.00661	550.33	0.05000	480.58
244	0.01000	717.22	1.00000	717.22	0.00100	550.33	0.05000	463.77
245	0.01000	1004.86	1.00025	1004.86	0.03082	550.33	0.05000	550.01
246	0.01000	948.50	0.93483	948.50	0.02899	550.33	0.05000	545.45
247	0.01000	893.37	0.88478	893.37	0.02627	550.33	0.05000	538.63
248	0.01000	843.33	0.85764	843.32	0.02258	550.33	0.05000	529.35
249	0.01000	801.38	0.85762	801.38	0.01798	550.33	0.05000	517.74
250	0.01000	769.16	0.88469	769.16	0.01263	550.33	0.05000	504.29
251	0.01000	746.90	0.93468	746.90	0.00684	550.33	0.05000	489.76
252	0.01000	733.58	1.00000	733.58	0.00100	550.33	0.05000	475.18
253	0.01000	1019.81	1.00040	1019.81	0.03313	550.33	0.05000	550.12
254	0.01000	963.09	0.93204	963.09	0.03137	550.33	0.05000	546.35
255	0.01000	907.81	0.87976	907.81	0.02861	550.33	0.05000	540.68
256	0.01000	857.91	0.85140	857.91	0.02472	550.33	0.05000	532.95
257	0.01000	816.45	0.85136	816.45	0.01976	550.33	0.05000	523.28
258	0.01000	785.06	0.87960	785.06	0.01391	550.33	0.05000	512.07
259	0.01000	763.89	0.93178	763.89	0.00751	550.33	0.05000	499.97
260	0.01000	751.80	1.00000	751.80	0.00100	550.33	0.05000	487.84
261	0.01000	1035.09	1.00031	1035.09	0.03539	550.33	0.05000	550.32
262	0.01000	978.26	0.92463	978.26	0.03416	550.33	0.05000	547.41
263	0.01000	923.11	0.86681	923.11	0.03169	550.33	0.05000	543.01
264	0.01000	873.65	0.83548	873.65	0.02779	550.33	0.05000	536.99
265	0.01000	832.94	0.83545	832.94	0.02248	550.33	0.05000	529.44
266	0.01000	802.57	0.86670	802.57	0.01595	550.33	0.05000	520.68
267	0.01000	782.64	0.92444	782.64	0.00861	550.33	0.05000	511.23
268	0.01000	771.89	1.00000	771.89	0.00100	550.33	0.05000	501.76
323	0.01000	1311.90	1.49095	1311.90	0.03141	550.33	0.05000	550.32
324	0.01000	1291.17	1.43804	1291.17	0.03333	550.33	0.05000	550.32
325	0.01000	1269.62	1.41378	1269.62	0.03231	550.33	0.05000	550.32
326	0.01000	1247.44	1.41797	1247.44	0.02838	550.33	0.05000	550.32
327	0.01000	1224.82	1.44907	1224.82	0.02173	550.33	0.05000	550.32
335	0.01000	1236.07	1.34298	1236.07	0.03361	550.33	0.05000	550.32
336	0.01000	1217.25	1.30651	1217.25	0.03418	550.33	0.05000	550.32
337	0.01000	1197.88	1.28990	1197.88	0.03269	550.33	0.05000	550.32
338	0.01000	1178.10	1.29313	1178.10	0.02915	550.33	0.05000	550.32
339	0.01000	1158.12	1.31525	1158.12	0.02369	550.33	0.05000	550.32
347	0.01000	1165.58	1.21322	1165.58	0.03502	550.33	0.05000	550.32
348	0.01000	1148.42	1.19104	1148.42	0.03446	550.33	0.05000	550.32
349	0.01000	1130.99	1.18104	1130.99	0.03261	550.33	0.05000	550.32
350	0.01000	1113.36	1.18338	1113.36	0.02945	550.33	0.05000	550.32
351	0.01000	1095.72	1.19769	1095.72	0.02507	550.33	0.05000	550.32
359	0.01000	1101.06	1.10267	1101.06	0.03563	550.33	0.05000	550.32
360	0.01000	1085.22	1.09251	1085.22	0.03416	550.33	0.05000	550.32
361	0.01000	1069.37	1.08801	1069.37	0.03205	550.33	0.05000	550.32
362	0.01000	1053.58	1.08947	1053.58	0.02928	550.33	0.05000	550.32
363	0.01000	1037.91	1.09695	1037.91	0.02585	550.33	0.05000	550.32
395	0.01000	1433.32	1.74265	1433.32	0.02665	550.33	0.05000	549.69
396	0.01000	1412.09	1.66654	1412.09	0.03094	550.33	0.05000	549.87
397	0.01000	1389.44	1.63332	1389.44	0.03083	550.33	0.05000	550.02
398	0.01000	1365.36	1.64299	1365.36	0.02632	550.33	0.05000	550.15
399	0.01000	1339.86	1.69554	1339.86	0.01741	550.33	0.05000	550.26
407	0.01000	1379.48	1.62896	1379.48	0.02894	550.33	0.05000	550.32
408	0.01000	1357.85	1.56220	1357.85	0.03215	550.33	0.05000	550.32
409	0.01000	1335.02	1.53193	1335.02	0.03161	550.33	0.05000	550.32
410	0.01000	1311.22	1.53805	1311.22	0.02736	550.33	0.05000	550.32
411	0.01000	1286.51	1.57905	1286.51	0.01955	550.33	0.05000	550.32

OPTIMIZATION SYSTEM FOR TPSSYM = 19

```
 TOTAL NUMBER OF DESIGN VARIABLES =   36
 TOTAL NUMBER OF CONSTRAINS       =  956
 TOTAL NUMBER OF TEMP. CONSTRAINS =  468
 TOTAL NUMBER OF TEMP. PRINTOUTS  =   13


MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
    X   0.1202E+04
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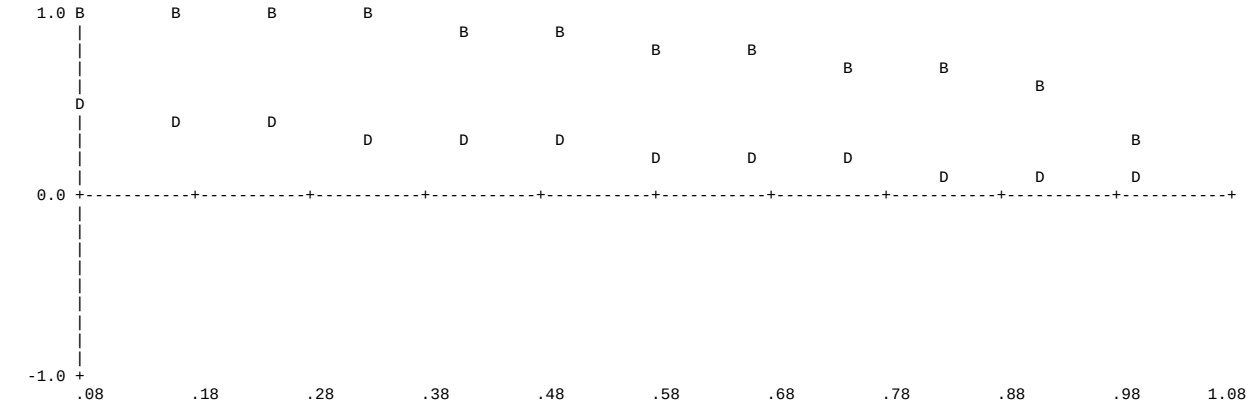


MAXIMUM TEMPERATURE OF EVERY LAYER

LAYER:	1	2	3	4
Tmax:	2300.33	2300.33	550.33	600.33
Optv:	1202.26	1202.26	545.42	545.42

VALUES OF DESIGN VARIABLES :

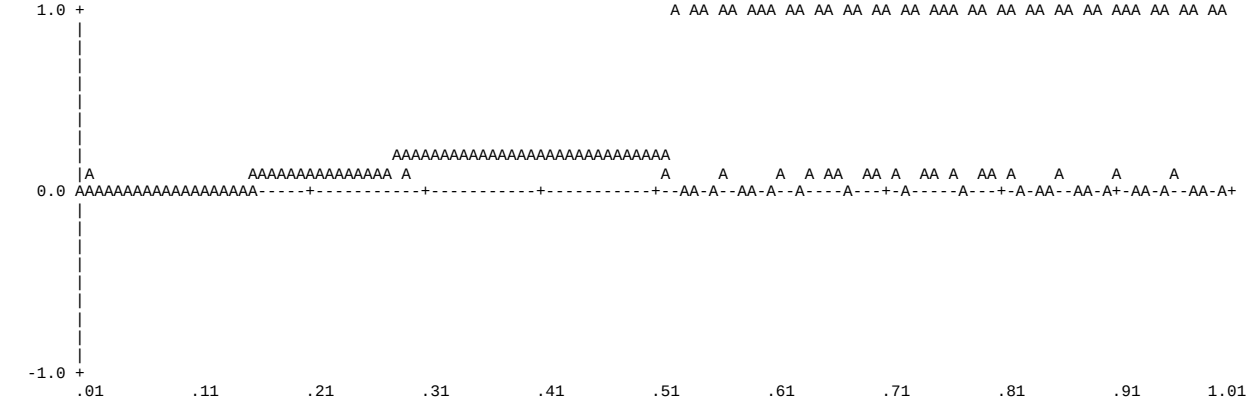
LAYER	DEV01	DEV02	DEV03	DEV04	DEV05	DEV06	DEV07	DEV08	DEV09
1	0.25947	0.38994	0.29487	0.40907	0.73258	0.52090	0.07117	0.12320	0.02213
2	1.00000	1.00000	1.05136	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
3	0.05629	0.06315	0.08323	0.00170	0.09930	0.02410	0.06222	0.04534	0.00110
4	0.12960	0.29291	0.11710	0.15414	0.19743	0.22999	0.05037	0.05243	0.05294

THE ORIGINAL OBJECTIVE FUNCTION = 207.8067017

THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 1.7568405

THE TOTAL OPTIMAL WEIGHT = 4.06264817E+05

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



OPTIMAL STRUCTURES OF TPS FOR PATCH = 19
(WITH AVERAGE THICKNESS)

HRSI COAT	thin skin	0.31370 in.	1202.3 F
LI-900 (P)	slab	1.00571 in.	1202.3 F
RTV-560	thin skin	0.04849 in.	545.4 F
17 LB SIP .16 IN	slab	0.14188 in.	545.4 F

THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH = 19

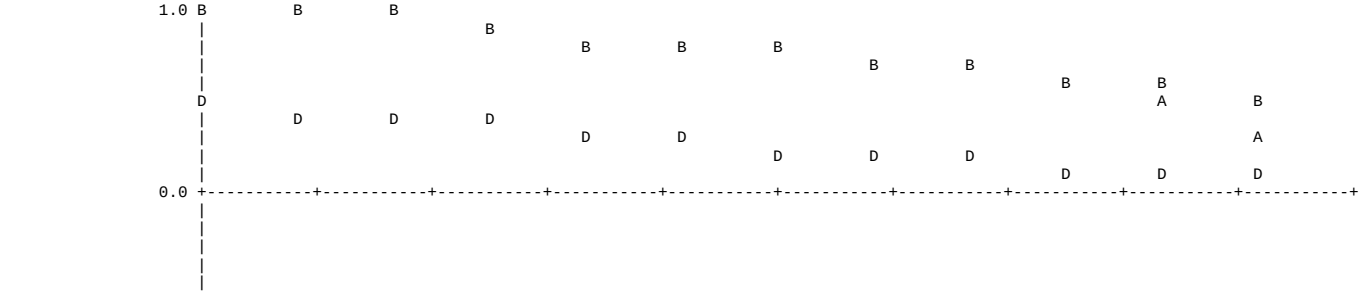
PANEL	LAYER01		LAYER02		LAYER03		LAYER04	
221	0.52090	786.52	1.00000	786.52	0.02410	550.33	0.22999	375.64
222	0.51509	736.21	0.99460	736.21	0.01668	550.07	0.23111	361.32
223	0.48847	693.10	0.99048	693.10	0.00997	549.87	0.22407	353.21
224	0.43690	661.99	0.98825	661.99	0.00460	549.76	0.20708	353.58
225	0.35968	645.89	0.98825	645.89	0.00101	549.77	0.17972	363.48

226	0.25985	645.41	0.99048	645.41	0.00100	549.90	0.14303	382.51
227	0.14416	658.80	0.99460	658.80	0.00100	550.10	0.09955	408.82
228	0.02213	682.32	1.00000	682.32	0.00110	550.33	0.05294	439.39
328	0.40306	1057.93	1.03269	1057.93	0.06352	549.85	0.16777	479.67
340	0.45225	979.73	1.02298	979.73	0.05268	549.67	0.19092	446.51
352	0.48804	909.87	1.01448	909.87	0.04266	549.73	0.20880	418.65
364	0.51066	848.45	1.00715	848.45	0.03356	549.97	0.22154	396.00
400	0.29487	1202.26	1.05136	1202.26	0.08323	550.33	0.11710	544.47
412	0.34872	1133.52	1.04229	1133.52	0.07381	550.16	0.14261	513.18
461	0.40907	722.96	1.00000	722.96	0.00170	550.33	0.15414	445.28
462	0.40308	682.08	1.00000	682.08	0.00100	543.64	0.15017	424.22
463	0.38344	646.18	1.00000	646.18	0.00144	533.70	0.14251	400.11
464	0.34779	619.10	1.00000	619.10	0.00669	520.32	0.13068	373.77
465	0.29566	603.02	1.00000	603.02	0.01603	503.62	0.11467	346.04
466	0.22906	598.58	1.00000	598.58	0.02909	484.26	0.09510	317.97
467	0.15214	604.69	1.00000	604.69	0.04497	463.27	0.07311	290.68
468	0.07117	618.75	1.00000	618.75	0.06222	442.10	0.05037	265.45
469	0.63817	669.47	1.00007	669.47	0.07235	467.32	0.17652	282.61
470	0.63502	621.53	1.00073	621.53	0.07288	455.89	0.16104	258.39
471	0.60938	580.58	1.00122	580.58	0.07260	444.96	0.14365	238.88
472	0.55682	568.28	1.00149	551.31	0.07133	435.39	0.12499	226.71
473	0.47628	568.28	1.00148	536.40	0.06899	427.78	0.10571	223.29
474	0.37088	568.28	1.00119	536.44	0.06568	422.40	0.08656	228.75
475	0.24748	568.28	1.00067	549.79	0.06164	419.23	0.06826	241.90
476	0.11640	572.87	1.00000	572.87	0.05722	417.95	0.05160	260.40
477	0.73258	662.95	1.00000	662.95	0.09930	440.21	0.19743	217.47
478	0.73074	610.93	1.00000	610.93	0.09974	428.13	0.17876	217.47
479	0.70224	568.28	1.00000	566.95	0.09767	418.35	0.15804	217.47
480	0.64159	568.28	1.00000	536.13	0.09255	412.15	0.13607	217.47
481	0.54748	568.28	1.00000	521.51	0.08422	410.27	0.11367	217.47
482	0.42354	568.28	1.00000	523.64	0.07299	412.78	0.09172	217.47
483	0.27802	568.28	1.00000	540.60	0.05965	419.08	0.07104	245.30
484	0.12320	568.28	1.00000	568.28	0.04534	428.03	0.05243	287.79
485	0.69288	702.47	0.99996	702.47	0.08299	468.25	0.21554	249.03
486	0.69052	650.08	0.99796	650.08	0.08088	459.88	0.20251	227.94
487	0.66209	605.02	0.99642	605.02	0.07675	453.54	0.18516	217.47
488	0.60195	573.31	0.99558	573.31	0.07031	450.40	0.16365	217.47
489	0.50890	568.28	0.99559	558.13	0.06157	451.01	0.13848	231.90
490	0.38656	568.28	0.99642	560.07	0.05087	455.36	0.11060	260.97
491	0.24322	577.12	0.99798	577.12	0.03888	462.85	0.08145	301.14
492	0.09160	604.96	1.00000	604.96	0.02657	472.36	0.05288	347.69
493	0.33542	944.08	1.00000	944.08	0.03213	550.33	0.14479	517.57
494	0.36681	881.01	1.00000	881.01	0.02136	550.33	0.15047	501.01
495	0.38953	824.32	1.00000	824.32	0.01279	550.33	0.15398	483.98
496	0.40360	773.97	1.00000	773.97	0.00640	550.33	0.15532	466.46
497	0.48731	935.14	0.99599	935.14	0.06406	522.21	0.23138	425.88
498	0.54648	858.70	0.99721	858.70	0.06689	507.29	0.21850	383.94
499	0.59121	790.34	0.99827	790.34	0.06921	493.46	0.20548	346.75
500	0.62139	730.06	0.99919	730.06	0.07099	480.77	0.19228	314.40
501	0.54808	951.85	0.99993	951.85	0.07924	510.53	0.26549	390.12
502	0.61949	868.52	0.99996	868.52	0.08667	489.96	0.24917	336.91
503	0.67379	794.10	0.99998	794.10	0.09245	471.73	0.23287	291.14
504	0.71090	728.66	1.00000	728.66	0.09658	455.87	0.21660	252.90
505	0.51878	993.59	1.01215	993.59	0.07870	520.25	0.24462	409.00
506	0.58702	909.59	1.00854	909.59	0.08161	504.54	0.24028	358.61
507	0.63849	834.62	1.00538	834.62	0.08332	490.90	0.23426	315.86
508	0.67320	768.77	1.00264	768.77	0.08384	479.34	0.22665	280.78
509	0.44407	1075.84	1.01580	1075.84	0.07515	535.90	0.24683	460.17
510	0.37037	1151.24	1.01934	1151.24	0.07156	550.33	0.24702	508.23
513	0.46899	1034.78	0.99992	1034.78	0.07114	531.12	0.28026	444.54
514	0.38994	1112.03	1.00000	1112.03	0.06315	550.33	0.29291	496.17
517	0.42073	1012.10	0.99474	1012.10	0.06105	536.80	0.24315	468.31
518	0.35299	1084.94	0.99355	1084.94	0.05805	550.33	0.25380	508.56
521	0.29871	1007.98	1.00000	1007.98	0.04402	550.33	0.13762	532.43
522	0.25947	1069.97	1.00000	1069.97	0.05629	550.33	0.12960	545.42

OPTIMIZATION SYSTEM FOR TPSSYM = 20

TOTAL NUMBER OF DESIGN VARIABLES = 36
TOTAL NUMBER OF CONSTRAINS = 844
TOTAL NUMBER OF TEMP. CONSTRAINS = 468
TOTAL NUMBER OF TEMP. PRINTOUTS = 13

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



MAXIMUM TEMPERATURE OF EVERY LAYER

LAYER:	1	2	3	4
Tmax:	2300.33	2300.33	550.33	600.33
Optv:	1141.82	1141.82	543.24	543.24

VALUES OF DESIGN VARIABLES :

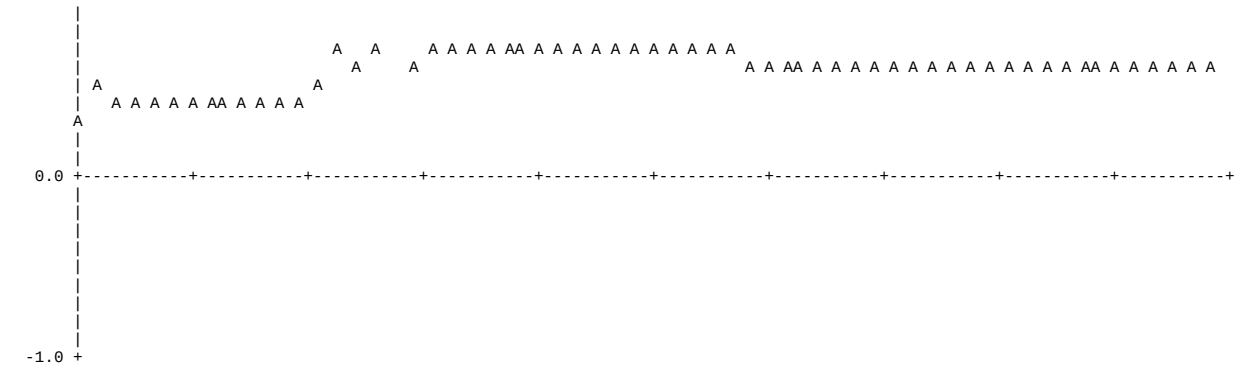
LAYER	DEV01	DEV02	DEV03	DEV04	DEV05	DEV06	DEV07	DEV08	DEV09
1	0.07036	0.01000	0.01000	0.07600	0.12296	0.10857	0.01001	0.13614	0.06223
2	1.11326	1.20167	1.20030	1.02858	1.05268	1.05540	1.00000	1.01651	1.00000
3	0.03467	0.10140	0.03991	0.01431	0.01977	0.02396	0.02535	0.02199	0.02676
4	0.05000	0.05000	0.05000	0.05000	0.08853	0.05000	0.05000	0.07467	0.05000

THE ORIGINAL OBJECTIVE FUNCTION = 166.2477417

THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.6226656

THE TOTAL OPTIMAL WEIGHT = 1.24153078E+05

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



OPTIMAL STRUCTURES OF TPS FOR PATCH = 20
(WITH AVERAGE THICKNESS)

HRSI COAT	thin skin	0.06736 in.	1141.8 F i
LI-900 (P)	slab	1.07427 in.	1141.8 F i
RTV-560	thin skin	0.03424 in.	543.2 F i
17 LB SIP .16 IN	slab	0.05702 in.	543.2 F i

THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH = 20

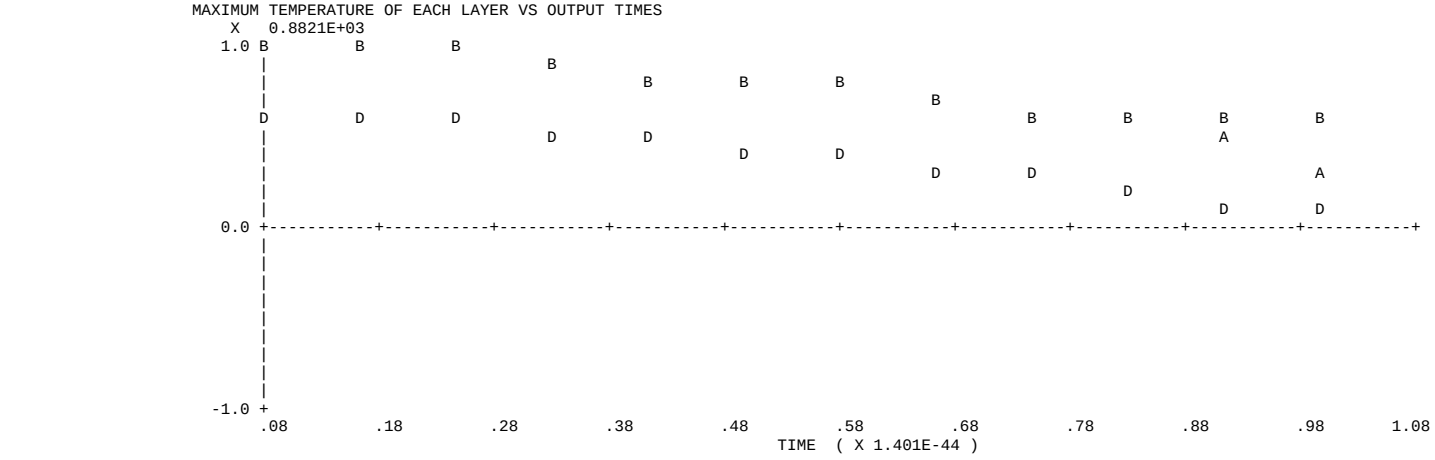
PANEL	LAYER01		LAYER02		LAYER03		LAYER04	
557	0.07600	826.62	1.02858	826.62	0.01431	550.33	0.05000	477.64
558	0.07233	790.81	1.01907	790.81	0.01316	546.11	0.05000	462.60
559	0.06659	754.82	1.01053	754.82	0.01277	539.92	0.05000	444.72
560	0.05860	721.01	1.00379	721.01	0.01338	531.63	0.05000	424.42
561	0.04841	691.14	0.99938	691.14	0.01508	521.35	0.05000	402.29
562	0.03642	666.35	0.99746	666.35	0.01782	509.46	0.05000	379.18
563	0.02331	647.07	0.99784	647.07	0.02136	496.63	0.05000	356.13
564	0.01001	633.12	1.00000	633.12	0.02535	483.72	0.05000	334.32
565	0.11268	800.99	1.04354	800.99	0.01610	550.18	0.08875	444.12
566	0.12076	757.68	1.02979	757.68	0.00861	542.97	0.09149	443.33
567	0.12722	713.54	1.01807	713.54	0.00312	532.37	0.09295	437.12
568	0.13115	671.32	1.00974	671.32	0.00100	518.16	0.09270	424.42
569	0.13208	633.09	1.00557	633.09	0.00140	500.49	0.09052	404.99
570	0.12998	600.31	1.00572	600.31	0.00560	480.07	0.08651	379.57
571	0.12526	573.69	1.00971	573.69	0.01264	457.98	0.08103	349.82
572	0.11873	553.28	1.01651	553.28	0.02152	435.76	0.07467	318.24
573	0.12296	800.05	1.05274	800.05	0.01977	550.33	0.08854	434.20
574	0.13463	754.24	1.03619	754.24	0.01204	543.18	0.09137	433.33
575	0.14413	708.22	1.02192	708.22	0.00623	532.57	0.09293	427.46
576	0.15023	665.08	1.01154	665.08	0.00326	518.31	0.09273	415.63

577	0.15227	626.97	1.00595	626.97	0.00361	500.55	0.09060	397.62
578	0.15015	595.38	1.00537	595.38	0.00725	479.98	0.08659	374.10
579	0.14441	570.83	1.00928	570.83	0.01369	457.70	0.08108	346.61
580	0.13614	553.08	1.01651	553.08	0.02199	435.26	0.07467	317.43
581	0.10857	821.97	1.05540	821.97	0.02396	550.33	0.05000	450.66
582	0.11534	778.92	1.03779	778.92	0.02257	546.11	0.05000	434.37
583	0.11845	737.58	1.02186	737.58	0.02163	539.84	0.05000	416.63
584	0.11669	701.25	1.00916	701.25	0.02134	531.41	0.05001	398.26
585	0.10954	672.03	1.00062	672.03	0.02177	520.90	0.05001	379.95
586	0.09728	651.06	0.99656	651.06	0.02291	508.73	0.05000	362.39
587	0.08094	638.25	0.99665	638.25	0.02465	495.53	0.05000	346.19
588	0.06223	632.53	1.00000	632.53	0.02676	482.22	0.05000	331.91
589	0.07616	1007.29	1.08561	1007.29	0.02698	550.33	0.05000	528.90
590	0.07832	958.61	1.06916	958.61	0.02275	550.33	0.05000	518.04
591	0.07907	913.11	1.05440	913.11	0.01926	550.33	0.05000	506.20
592	0.07843	870.78	1.04134	870.78	0.01652	550.33	0.05000	493.38
593	0.07116	1003.74	1.09807	1003.74	0.04195	550.33	0.05537	483.22
594	0.07709	952.61	1.08707	952.61	0.04063	550.33	0.06362	459.06
595	0.08697	902.46	1.07347	902.46	0.03418	550.33	0.07258	449.08
596	0.09875	853.91	1.05917	853.91	0.02575	550.33	0.08091	445.73
597	0.05433	1007.55	1.14140	1007.55	0.07491	550.33	0.06700	386.26
598	0.07359	953.04	1.11673	953.04	0.05763	550.33	0.07502	405.30
599	0.09150	901.16	1.09392	901.16	0.04278	550.33	0.08120	419.86
600	0.10748	852.31	1.07337	852.31	0.03058	550.33	0.08557	429.41
601	0.04995	1027.70	1.14957	1027.70	0.04153	550.33	0.05320	489.90
602	0.06934	971.52	1.12273	971.52	0.03454	550.33	0.05340	485.34
603	0.08538	919.52	1.09862	919.52	0.02959	550.33	0.05282	477.02
604	0.09806	871.88	1.07717	871.88	0.02626	550.33	0.05170	465.95
605	0.07366	1045.48	1.09892	1045.48	0.03061	550.33	0.05000	536.32
606	0.05824	1046.81	1.12644	1046.81	0.06295	550.33	0.05470	445.20
607	0.03408	1059.48	1.16944	1059.48	0.09069	550.33	0.05866	369.63
608	0.02995	1084.15	1.17548	1084.15	0.04408	550.33	0.05115	507.03
609	0.07036	1085.67	1.11326	1085.67	0.03467	550.33	0.05000	543.24
610	0.02990	1098.06	1.17298	1098.06	0.10027	550.33	0.05000	367.06
611	0.01000	1116.82	1.20167	1116.82	0.10140	550.33	0.05000	368.27
612	0.01000	1141.82	1.20030	1141.82	0.03991	550.33	0.05000	541.83

OPTIMIZATION SYSTEM FOR TPSSYM = 21

TOTAL NUMBER OF DESIGN VARIABLES = 36
TOTAL NUMBER OF CONSTRAINS = 1164
TOTAL NUMBER OF TEMP. CONSTRAINS = 468
TOTAL NUMBER OF TEMP. PRINTOUTS = 13

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



MAXIMUM TEMPERATURE OF EVERY LAYER

LAYER:	1	2	3	4
Tmax:	2300.33	2300.33	550.33	600.33
Optv:	882.09	882.09	548.74	548.93

VALUES OF DESIGN VARIABLES :

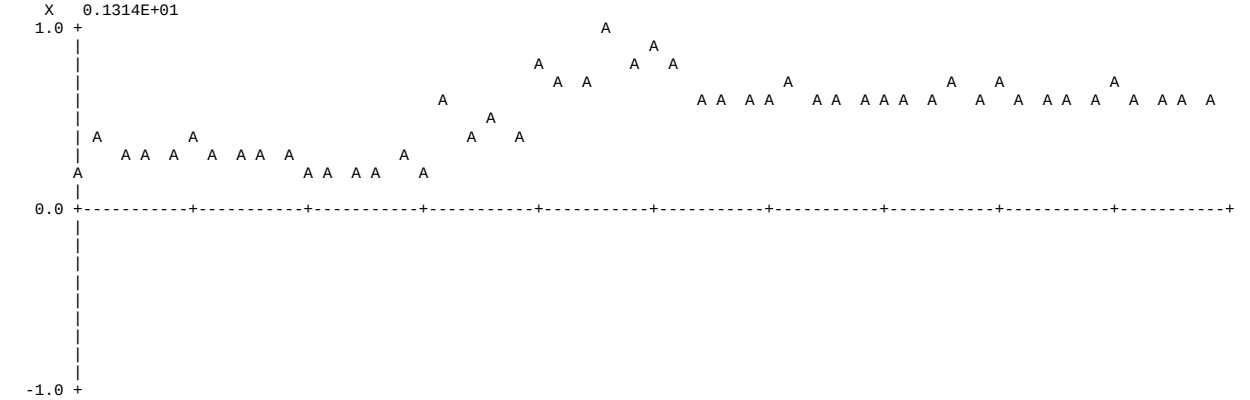
LAYER	DEV01	DEV02	DEV03	DEV04	DEV05	DEV06	DEV07	DEV08	DEV09
1	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000
2	1.00000	1.12466	1.13139	1.00000	1.06586	1.05013	1.00000	1.20693	1.23164
3	0.00100	0.00100	0.00100	0.00100	0.46653	0.00100	0.00100	0.03518	0.00100
4	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000

THE ORIGINAL OBJECTIVE FUNCTION = 284.9608765

THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.7809880

THE TOTAL OPTIMAL WEIGHT = 9.88459207E+04

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



OPTIMAL STRUCTURES OF TPS FOR PATCH = 21
(WITH AVERAGE THICKNESS)

HRSI COAT	thin skin	0.01000 in.	882.1 F
LI-900 (P)	slab	1.09003 in.	882.1 F
RTV-560	thin skin	0.05652 in.	548.7 F
17 LB SIP .16 IN	slab	0.05000 in.	548.9 F

THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH = 21

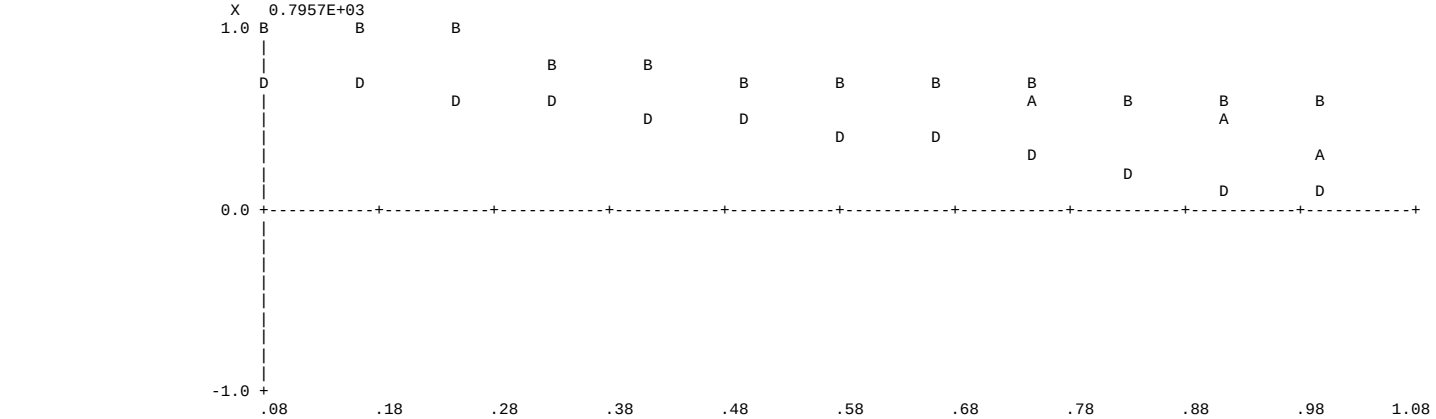
PANEL	LAYER01		LAYER02		LAYER03		LAYER04	
717	0.01000	882.09	1.13139	882.09	0.00100	550.33	0.05000	548.93
718	0.01000	868.91	1.14181	868.91	0.00109	550.32	0.05000	536.52
719	0.01000	855.28	1.14462	855.28	0.00115	550.31	0.05000	525.68
720	0.01000	841.17	1.13983	841.17	0.00103	550.33	0.05000	516.51
721	0.01000	867.74	1.10113	867.74	0.00117	550.33	0.05000	545.37
722	0.01000	857.56	1.11220	857.56	0.06981	542.14	0.05000	483.43
723	0.01000	847.04	1.11643	847.04	0.11796	535.02	0.05000	438.39
724	0.01000	836.13	1.11384	836.13	0.14612	530.83	0.05000	409.83
725	0.01000	852.30	1.07765	852.30	0.00152	550.33	0.05000	539.39
726	0.01000	844.82	1.08928	844.82	0.12798	534.00	0.05000	435.41
727	0.01000	837.08	1.09466	837.08	0.21635	520.75	0.04999	361.65
728	0.01000	829.05	1.09381	829.05	0.26762	513.03	0.04999	317.32
729	0.01000	835.75	1.06093	835.75	0.00173	550.33	0.05000	531.20
730	0.01000	830.66	1.07304	830.66	0.17501	525.96	0.04999	392.87
731	0.01000	825.38	1.07929	825.38	0.29586	507.55	0.04999	295.77
732	0.01000	819.90	1.07968	819.90	0.36515	496.97	0.04999	239.22
733	0.01000	806.89	1.07073	806.89	0.44556	481.00	0.04999	168.91
734	0.01000	792.02	1.06926	792.02	0.49066	468.36	0.04998	152.18
735	0.01000	772.43	1.07546	772.43	0.50691	456.90	0.04998	152.18
736	0.01000	748.09	1.09106	748.09	0.48503	447.71	0.04999	152.18
737	0.01000	719.43	1.11661	719.43	0.42105	441.48	0.04999	152.18
738	0.01000	687.88	1.15080	687.88	0.31841	438.50	0.04999	152.18
739	0.01000	654.81	1.19148	654.81	0.18509	438.47	0.05000	188.40
740	0.01000	622.04	1.23544	622.04	0.03356	440.78	0.05000	259.49
741	0.01000	809.92	1.06947	809.92	0.36055	494.24	0.04999	236.16
742	0.01000	793.27	1.06777	793.27	0.39659	483.38	0.04999	194.81
743	0.01000	772.29	1.07438	772.29	0.40931	473.07	0.04999	164.87
744	0.01000	747.13	1.09119	747.13	0.39140	464.14	0.04999	152.18
745	0.01000	718.18	1.11897	718.18	0.33923	457.10	0.04999	157.45
746	0.01000	687.41	1.15570	687.41	0.25688	452.41	0.04999	182.05
747	0.01000	655.74	1.19936	655.74	0.15031	449.81	0.05000	222.16
748	0.01000	624.33	1.24727	624.33	0.02735	449.03	0.05000	273.69
749	0.01000	812.84	1.06260	812.84	0.21249	517.32	0.04999	353.05
750	0.01000	794.51	1.06067	794.51	0.23341	509.55	0.04999	323.04
751	0.01000	772.19	1.06737	772.19	0.24069	501.25	0.04999	297.85
752	0.01000	746.27	1.08462	746.27	0.23003	492.84	0.04999	280.47
753	0.01000	717.14	1.11333	717.14	0.19928	484.59	0.04999	272.65
754	0.01000	686.90	1.15131	686.90	0.15104	477.04	0.05000	274.65
755	0.01000	656.35	1.19640	656.35	0.08850	470.35	0.05000	285.32
756	0.01000	626.42	1.24600	626.42	0.01646	464.45	0.05000	302.47
757	0.01000	815.68	1.05013	815.68	0.00100	550.33	0.05000	519.89
758	0.01000	795.74	1.04797	795.74	0.00105	546.89	0.05000	506.13
759	0.01000	772.16	1.05439	772.16	0.00100	541.47	0.05000	487.94
760	0.01000	745.49	1.07135	745.49	0.00110	533.81	0.05000	465.08
761	0.01000	716.40	1.09956	716.40	0.00108	523.98	0.05000	438.04
762	0.01000	686.44	1.13745	686.44	0.00105	512.49	0.05000	408.23
763	0.01000	656.69	1.18259	656.69	0.00102	499.93	0.05000	376.94
764	0.01000	628.31	1.23164	628.31	0.00100	487.03	0.05000	345.75

938	0.01000	824.20	1.12466	824.20	0.00100	550.33	0.05000	507.73
939	0.01000	804.36	1.09531	804.36	0.00100	550.33	0.05000	500.32
940	0.01000	784.19	1.05407	784.19	0.00100	550.33	0.05000	495.61
941	0.01000	763.10	1.00000	763.10	0.00100	550.33	0.05000	493.41
945	0.01000	822.95	1.10213	822.95	0.15435	529.55	0.05000	396.91
946	0.01000	807.78	1.07831	807.78	0.13262	532.65	0.05000	408.13
947	0.01000	792.82	1.04517	792.82	0.08258	539.91	0.05000	443.17
948	0.01000	776.93	1.00075	776.93	0.00241	550.33	0.05000	503.04
952	0.01000	819.44	1.08502	819.44	0.28122	510.90	0.04999	302.34
953	0.01000	808.47	1.06579	808.47	0.24054	516.86	0.04999	330.09
954	0.01000	797.62	1.03821	797.62	0.14901	530.38	0.05000	398.48
955	0.01000	786.04	1.00050	786.04	0.00304	550.33	0.05000	510.05
959	0.01000	813.49	1.07307	813.49	0.38205	494.35	0.04999	223.63
960	0.01000	806.19	1.05728	806.19	0.32700	502.64	0.04999	264.43
961	0.01000	798.71	1.03308	798.71	0.20008	521.83	0.04999	361.83
962	0.01000	790.83	1.00000	790.83	0.00100	550.33	0.05000	515.97
1205	0.01000	608.85	1.00000	608.85	0.00100	499.36	0.05000	390.27
1206	0.01000	612.60	1.08829	612.60	0.01912	469.03	0.05000	325.69
1207	0.01000	616.08	1.15717	616.08	0.03050	449.27	0.05000	282.55
1208	0.01000	619.32	1.20693	619.32	0.03518	440.00	0.05000	260.69
1212	0.01000	650.61	1.00010	650.61	0.00115	509.73	0.05000	419.81
1213	0.01000	651.77	1.07276	651.77	0.10377	471.90	0.05000	298.84
1214	0.01000	652.83	1.12897	652.83	0.16770	447.62	0.05000	220.72
1215	0.01000	653.80	1.16932	653.80	0.19382	436.63	0.04999	184.53
1219	0.01000	690.44	1.00008	690.44	0.00125	519.91	0.05000	447.96
1220	0.01000	689.69	1.05834	689.69	0.17798	476.04	0.04999	278.58
1221	0.01000	689.00	1.10287	689.00	0.28841	448.11	0.04999	170.28
1222	0.01000	688.38	1.13429	688.38	0.33439	435.73	0.04999	152.18
1226	0.01000	725.54	1.00016	725.54	0.00185	529.10	0.05000	472.15
1227	0.01000	723.81	1.04638	723.81	0.23564	481.35	0.04999	266.98
1228	0.01000	722.23	1.08110	722.23	0.38163	451.16	0.04999	152.18
1229	0.01000	720.78	1.10489	720.78	0.44258	438.03	0.04999	152.18
1233	0.01000	753.85	1.00021	753.85	0.00257	536.90	0.05000	491.28
1234	0.01000	752.20	1.03747	752.20	0.27170	487.90	0.04999	266.14
1235	0.01000	750.68	1.06493	750.68	0.43954	457.07	0.04999	152.18
1236	0.01000	749.26	1.08306	749.26	0.50938	443.86	0.04998	152.18
1240	0.01000	773.94	1.00015	773.94	0.00238	543.08	0.05000	505.16
1241	0.01000	773.45	1.03194	773.45	0.28319	495.56	0.04999	277.07
1242	0.01000	773.02	1.05500	773.02	0.45878	465.68	0.04999	152.18
1243	0.01000	772.66	1.06968	772.66	0.53198	452.99	0.04998	152.18
1247	0.01000	786.01	1.00008	786.01	0.00177	547.51	0.05000	513.56
1248	0.01000	787.59	1.02971	787.59	0.27292	503.84	0.04999	297.64
1249	0.01000	789.12	1.05104	789.12	0.44331	476.30	0.04999	161.41
1250	0.01000	790.62	1.06433	790.62	0.51449	464.67	0.04998	152.18
1254	0.01000	791.19	1.00000	791.19	0.00100	550.33	0.05000	517.11
1255	0.01000	795.46	1.03017	795.46	0.24627	512.15	0.04999	324.58
1256	0.01000	799.53	1.05199	799.53	0.40154	487.94	0.04999	202.81
1257	0.01000	803.43	1.06556	803.43	0.46653	477.76	0.04999	152.18

OPTIMIZATION SYSTEM FOR TPSSYM = 22

TOTAL NUMBER OF DESIGN VARIABLES = 36
TOTAL NUMBER OF CONSTRAINS = 876
TOTAL NUMBER OF TEMP. CONSTRAINS = 468
TOTAL NUMBER OF TEMP. PRINTOUTS = 13

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



MAXIMUM TEMPERATURE OF EVERY LAYER

LAYER:	1	2	3	4
Tmax:	2300.33	2300.33	550.33	600.33
Optv:	795.73	795.73	520.52	520.52

VALUES OF DESIGN VARIABLES :

LAYER	DEV01	DEV02	DEV03	DEV04	DEV05	DEV06	DEV07	DEV08	DEV09
1	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000

```
   2  1.00000  1.00000  1.00000  1.00000  1.00000  1.00000  1.00000  1.00000  1.00000
   3  0.00100  0.00100  0.00100  0.00100  0.00100  0.00100  0.00100  0.00100  0.00100
   4  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000

 THE ORIGINAL OBJECTIVE FUNCTION =     178.1200104

 THE RATIO OF OPTIMAL OBJECTIVE FUNCTION =   0.3081630

 THE TOTAL OPTIMAL WEIGHT = 2.60391281E+04


 OBJECTIVE FUNCTION VS ITERATIONS :
          1  0.3081630
          2  0.3081630


MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
    X   0.3082E+00
   1.0 A
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   0.0 +-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+
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       |
  -1.0 +
       1.00        1.10        1.20        1.30        1.40        1.50        1.60        1.70        1.80        1.90      2.00
                                                                  TIME  ( X 0.000E+00 )

              OPTIMAL STRUCTURES OF TPS FOR PATCH =      22
                        (WITH AVERAGE THICKNESS)
 ============================================================   -----
                        HRSI COAT            thin skin           0.01000 in.   795.7 F
 ============================================================   -----
                                                                   i
                        LI-900 (P)           slab                1.00000 in.   795.7 F
                                                                   i
 ============================================================   -----
                        RTV-560              thin skin           0.00100 in.   520.5 F
 ============================================================   -----
                                                                   i
                        17 LB SIP .16 IN     slab                0.05000 in.   520.5 F
                                                                   i
 ============================================================   -----


          THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =      22

   PANEL   LAYER01            LAYER02            LAYER03            LAYER04
     942   0.01000    704.32   1.00000    704.32   0.00100    550.33   0.05000    451.20
     943   0.01000    653.23   1.00000    653.23   0.00100    523.73   0.05000    415.76
     944   0.01000    605.23   1.00000    605.23   0.00100    494.04   0.05000    383.55
     949   0.01000    733.58   1.00000    733.58   0.00100    550.33   0.05000    473.03
     950   0.01000    700.05   1.00000    700.05   0.00100    533.25   0.05000    449.96
     951   0.01000    667.22   1.00000    667.22   0.00100    512.37   0.05000    427.99
     956   0.01000    756.61   1.00000    756.61   0.00100    550.33   0.05000    490.34
     957   0.01000    738.34   1.00000    738.34   0.00100    540.75   0.05000    478.02
     958   0.01000    718.91   1.00000    718.91   0.00100    527.65   0.05000    465.11
     963   0.01000    773.45   1.00000    773.45   0.00100    550.33   0.05000    503.18
     964   0.01000    768.22   1.00000    768.22   0.00100    546.30   0.05000    500.04
     965   0.01000    760.23   1.00000    760.23   0.00100    539.86   0.05000    494.84
    1202   0.01000    597.17   1.00000    597.17   0.00100    489.75   0.05000    382.71
    1203   0.01000    601.29   1.00000    601.29   0.00100    493.13   0.05000    385.37
    1204   0.01000    605.09   1.00000    605.09   0.00100    496.26   0.05000    387.83
    1209   0.01000    668.58   1.00000    668.58   0.00100    511.27   0.05000    433.04
    1210   0.01000    663.04   1.00000    663.04   0.00100    509.18   0.05000    429.16
    1211   0.01000    655.06   1.00000    655.06   0.00100    507.34   0.05000    423.25
    1216   0.01000    731.95   1.00000    731.95   0.00100    530.40   0.05000    477.60
    1217   0.01000    718.58   1.00000    718.58   0.00100    523.94   0.05000    468.41
    1218   0.01000    701.06   1.00000    701.06   0.00100    518.16   0.05000    455.73
    1223   0.01000    780.97   1.00000    780.97   0.00100    545.25   0.05000    511.97
    1224   0.01000    762.85   1.00000    762.85   0.00100    536.17   0.05000    499.57
    1225   0.01000    739.37   1.00000    739.37   0.00100    528.03   0.05000    482.64
    1230   0.01000    795.73   1.00000    795.73   0.00100    550.33   0.05000    520.52
    1231   0.01000    792.52   1.00000    792.52   0.00100    545.04   0.05000    520.21
    1232   0.01000    767.36   1.00000    767.36   0.00100    536.41   0.05000    502.04
    1237   0.01000    795.73   1.00000    795.73   0.00100    550.33   0.05000    520.52
    1238   0.01000    795.73   1.00000    795.73   0.00100    550.14   0.05000    520.52
    1239   0.01000    783.66   1.00000    783.66   0.00100    542.91   0.05000    512.97
    1244   0.01000    795.73   1.00000    795.73   0.00100    550.33   0.05000    520.52
    1245   0.01000    795.73   1.00000    795.73   0.00100    550.33   0.05000    520.52
    1246   0.01000    789.01   1.00000    789.01   0.00100    547.49   0.05000    515.99
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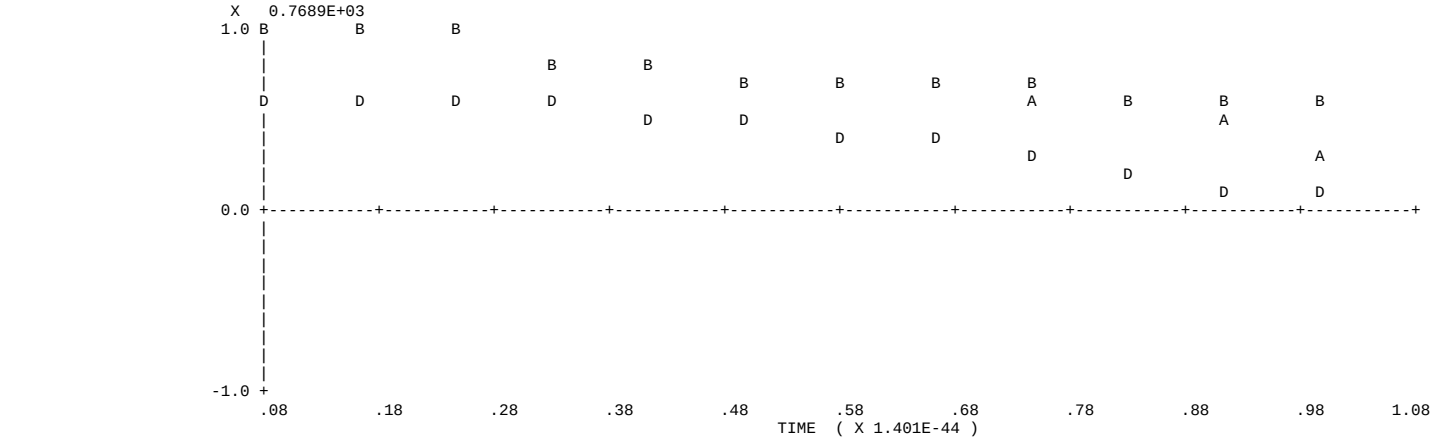
1251	0.01000	795.73	1.00000	795.73	0.00100	550.33	0.05000	520.51
1252	0.01000	792.80	1.00000	792.80	0.00100	550.33	0.05000	518.34
1253	0.01000	785.51	1.00000	785.51	0.00100	550.33	0.05000	512.67
1590	0.01000	561.42	1.00000	561.42	0.00100	461.38	0.05000	355.39
1591	0.01000	520.75	1.00000	520.75	0.00100	425.30	0.05000	330.54
1598	0.01000	636.38	1.00000	636.38	0.00100	489.56	0.05000	408.05
1599	0.01000	606.51	1.00000	606.51	0.00100	464.46	0.05000	389.43
1606	0.01000	699.30	1.00000	699.30	0.00100	513.41	0.05000	452.29
1607	0.01000	678.80	1.00000	678.80	0.00100	497.82	0.05000	439.07
1614	0.01000	750.17	1.00000	750.17	0.00100	532.90	0.05000	488.09
1615	0.01000	737.62	1.00000	737.62	0.00100	525.35	0.05000	479.47
1622	0.01000	794.76	1.00000	794.76	0.00100	550.32	0.05000	519.53
1623	0.01000	789.66	1.00000	789.66	0.00100	550.33	0.05000	515.20
1630	0.01000	795.73	1.00000	795.73	0.00100	550.33	0.05000	520.52
1631	0.01000	795.73	1.00000	795.73	0.00100	550.33	0.05000	520.52
1638	0.01000	795.73	1.00000	795.73	0.00100	550.33	0.05000	520.52
1639	0.01000	795.73	1.00000	795.73	0.00100	550.33	0.05000	520.52
1646	0.01000	795.73	1.00000	795.73	0.00100	550.33	0.05000	520.52
1647	0.01000	795.73	1.00000	795.73	0.00100	550.33	0.05000	520.52
1654	0.01000	793.38	1.00000	793.38	0.00100	550.33	0.05000	519.60
1655	0.01000	795.73	1.00000	795.73	0.00100	550.33	0.05000	520.52
1662	0.01000	740.90	1.00000	740.90	0.00100	537.46	0.05000	483.09
1663	0.01000	745.65	1.00000	745.65	0.00100	545.14	0.05000	485.04
1670	0.01000	671.60	1.00000	671.60	0.00100	513.60	0.05000	434.84
1671	0.01000	672.26	1.00000	672.26	0.00100	516.18	0.05000	434.67
1678	0.01000	592.76	1.00000	592.76	0.00100	486.14	0.05000	379.88
1679	0.01000	588.05	1.00000	588.05	0.00100	482.28	0.05000	376.86

OPTIMIZATION SYSTEM FOR TPSSYM = 23

TOTAL NUMBER OF DESIGN VARIABLES = 36
TOTAL NUMBER OF CONSTRAINS = 972
TOTAL NUMBER OF TEMP. CONSTRAINS = 468
TOTAL NUMBER OF TEMP. PRINTOUTS = 13

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



MAXIMUM TEMPERATURE OF EVERY LAYER

LAYER:	1	2	3	4
Tmax:	2300.33	2300.33	550.33	600.33
Optv:	768.93	768.93	498.81	498.81

VALUES OF DESIGN VARIABLES :

LAYER	DEV01	DEV02	DEV03	DEV04	DEV05	DEV06	DEV07	DEV08	DEV09
1	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000
2	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
3	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100
4	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000

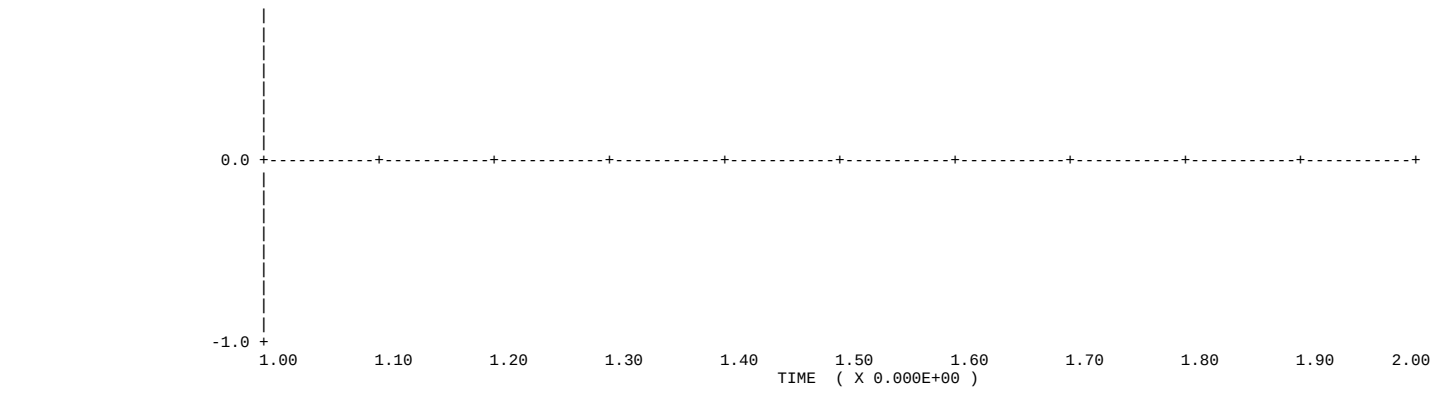
THE ORIGINAL OBJECTIVE FUNCTION = 213.8315887

THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.3081630

THE TOTAL OPTIMAL WEIGHT = 3.15029699E+04

OBJECTIVE FUNCTION VS ITERATIONS :
1 0.3081630
2 0.3081630

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



OPTIMAL STRUCTURES OF TPS FOR PATCH = 23
(WITH AVERAGE THICKNESS)

HRSI COAT	thin skin	0.01000 in.	768.9 F
LI-900 (P)	slab	1.00012 in.	768.9 F
RTV-560	thin skin	0.00100 in.	498.8 F
17 LB SIP .16 IN	slab	0.05001 in.	498.8 F

THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH = 23

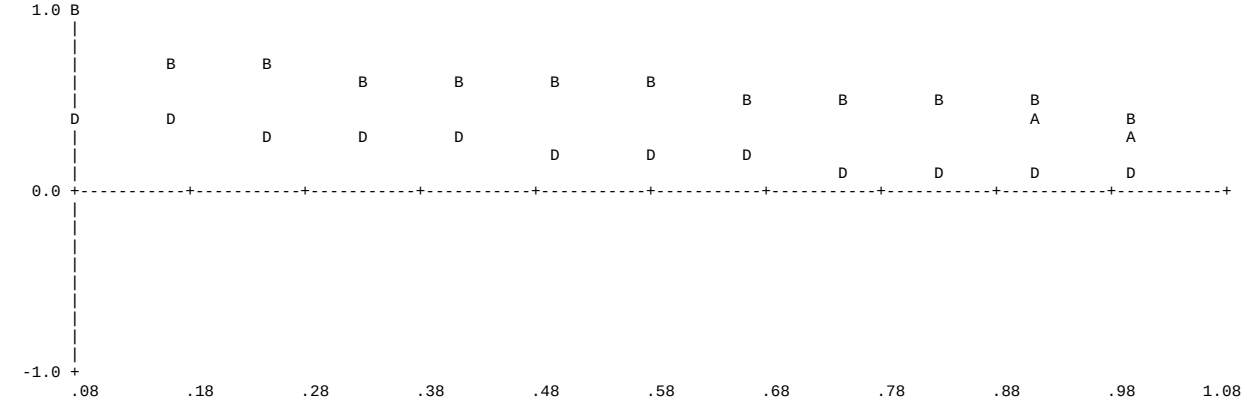
PANEL	LAYER01		LAYER02		LAYER03		LAYER04	
1592	0.01000	481.34	1.00000	481.34	0.00100	393.28	0.05000	305.89
1593	0.01000	443.26	1.00000	443.26	0.00100	361.47	0.05000	280.48
1594	0.01000	409.40	1.00000	409.40	0.00100	333.46	0.05000	258.10
1595	0.01000	381.06	1.00000	381.06	0.00100	310.05	0.05000	239.63
1596	0.01000	356.14	1.00000	356.14	0.00100	289.75	0.05000	223.67
1597	0.01000	335.53	1.00000	335.53	0.00100	273.18	0.05000	210.83
1600	0.01000	572.51	1.00000	572.51	0.00100	442.24	0.05000	367.06
1601	0.01000	541.51	1.00024	541.51	0.00100	420.37	0.05001	345.78
1602	0.01000	513.20	1.00036	513.20	0.00100	401.26	0.05002	326.56
1603	0.01000	488.63	1.00037	488.63	0.00100	385.55	0.05002	310.09
1604	0.01000	465.12	1.00025	465.12	0.00100	371.50	0.05001	294.58
1605	0.01000	443.99	1.00000	443.99	0.00100	359.98	0.05000	280.93
1608	0.01000	649.54	1.00000	649.54	0.00100	484.00	0.05000	418.73
1609	0.01000	624.85	1.00044	624.85	0.00100	470.75	0.05002	401.18
1610	0.01001	601.15	1.00066	601.15	0.00100	459.05	0.05003	384.59
1611	0.01001	579.65	1.00067	579.65	0.00100	449.65	0.05003	369.74
1612	0.01000	557.85	1.00046	557.85	0.00100	441.18	0.05002	354.96
1613	0.01000	536.68	1.00001	536.68	0.00100	434.13	0.05000	340.90
1616	0.01000	712.56	1.00000	712.56	0.00100	518.63	0.05000	461.01
1617	0.01001	693.40	1.00059	693.40	0.00100	512.59	0.05003	446.78
1618	0.01001	673.61	1.00089	673.61	0.00100	507.05	0.05004	432.43
1619	0.01001	654.49	1.00091	654.49	0.00100	502.81	0.05005	418.82
1620	0.01001	634.42	1.00062	634.42	0.00100	499.00	0.05003	404.87
1621	0.01000	613.61	1.00003	613.61	0.00100	495.68	0.05000	390.73
1624	0.01000	768.93	1.00000	768.93	0.00100	550.33	0.05000	498.81
1625	0.01001	754.46	1.00073	754.46	0.00100	550.33	0.05004	487.37
1626	0.01001	738.20	1.00110	738.20	0.00100	550.33	0.05005	475.07
1627	0.01001	720.99	1.00110	720.99	0.00100	550.33	0.05006	462.45
1628	0.01001	701.89	1.00074	701.89	0.00100	550.33	0.05004	448.89
1629	0.01000	680.80	1.00000	680.80	0.00100	550.33	0.05000	434.31
1632	0.01000	768.93	1.00000	768.93	0.00100	550.33	0.05000	498.81
1633	0.01001	768.93	1.00081	768.93	0.00100	550.33	0.05004	498.81
1634	0.01001	768.93	1.00121	768.93	0.00100	550.33	0.05006	498.81
1635	0.01001	765.17	1.00121	765.17	0.00100	550.33	0.05006	491.53
1636	0.01001	746.84	1.00081	746.84	0.00100	550.33	0.05004	478.32
1637	0.01000	725.65	1.00000	725.65	0.00100	550.33	0.05000	463.52
1640	0.01000	768.93	1.00000	768.93	0.00100	550.33	0.05000	498.81
1641	0.01001	768.93	1.00083	768.93	0.00100	550.33	0.05004	498.81
1642	0.01001	768.93	1.00125	768.93	0.00100	550.33	0.05006	498.81
1643	0.01001	768.93	1.00125	768.93	0.00100	550.33	0.05006	498.81
1644	0.01001	768.93	1.00083	768.93	0.00100	550.33	0.05004	497.06
1645	0.01000	754.72	1.00000	754.72	0.00100	550.33	0.05000	482.62
1648	0.01000	768.93	1.00000	768.93	0.00100	550.33	0.05000	498.81
1649	0.01001	768.93	1.00079	768.93	0.00100	550.33	0.05004	498.81
1650	0.01001	768.93	1.00119	768.93	0.00100	550.33	0.05006	498.81
1651	0.01001	768.93	1.00118	768.93	0.00100	550.33	0.05006	498.81
1652	0.01001	768.93	1.00079	768.93	0.00100	550.33	0.05004	498.81
1653	0.01000	761.66	1.00000	761.66	0.00100	550.33	0.05000	487.51
1656	0.01000	768.93	1.00000	768.93	0.00100	550.33	0.05000	498.81
1657	0.01001	768.93	1.00068	768.93	0.00100	550.33	0.05003	498.81
1658	0.01001	768.93	1.00102	768.93	0.00100	550.33	0.05005	498.81
1659	0.01001	768.93	1.00102	768.93	0.00100	550.33	0.05005	497.28
1660	0.01001	759.69	1.00068	759.69	0.00100	550.33	0.05003	487.70

1661	0.01000	743.41	1.00000	743.41	0.00100	550.33	0.05000	476.21
1664	0.01000	738.71	1.00000	738.71	0.00100	550.33	0.05000	478.32
1665	0.01000	736.15	1.00050	736.15	0.00100	550.33	0.05002	475.50
1666	0.01001	731.15	1.00075	731.15	0.00100	550.33	0.05004	471.24
1667	0.01001	723.64	1.00074	723.64	0.00100	550.33	0.05004	465.47
1668	0.01000	713.35	1.00050	713.35	0.00100	550.33	0.05002	458.03
1669	0.01000	700.67	1.00000	700.67	0.00100	550.33	0.05000	449.15
1672	0.01000	666.39	1.00000	666.39	0.00100	517.65	0.05000	429.74
1673	0.01000	663.28	1.00026	663.28	0.00100	519.79	0.05001	427.17
1674	0.01000	658.93	1.00039	658.93	0.00100	521.21	0.05002	423.87
1675	0.01000	653.34	1.00039	653.34	0.00100	521.92	0.05002	419.82
1676	0.01000	646.20	1.00026	646.20	0.00100	521.75	0.05001	414.85
1677	0.01000	637.86	1.00000	637.86	0.00100	520.86	0.05000	409.16
1680	0.01000	582.68	1.00000	582.68	0.00100	477.93	0.05000	373.51
1681	0.01000	578.25	1.00000	578.25	0.00100	474.34	0.05000	370.74
1682	0.01000	574.04	1.00000	574.04	0.00100	470.93	0.05000	368.13
1683	0.01000	570.04	1.00000	570.04	0.00100	467.70	0.05000	365.66
1684	0.01000	566.24	1.00000	566.24	0.00100	464.64	0.05000	363.33
1685	0.01000	562.65	1.00000	562.65	0.00100	461.76	0.05000	361.15

OPTIMIZATION SYSTEM FOR TPSSYM = 24

TOTAL NUMBER OF DESIGN VARIABLES = 36
TOTAL NUMBER OF CONSTRAINS = 1196
TOTAL NUMBER OF TEMP. CONSTRAINS = 468
TOTAL NUMBER OF TEMP. PRINTOUTS = 13

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



MAXIMUM TEMPERATURE OF EVERY LAYER

LAYER:	1	2	3	4
Tmax:	2300.33	2300.33	550.33	600.33
Optv:	1391.98	1391.98	550.28	550.28

VALUES OF DESIGN VARIABLES :

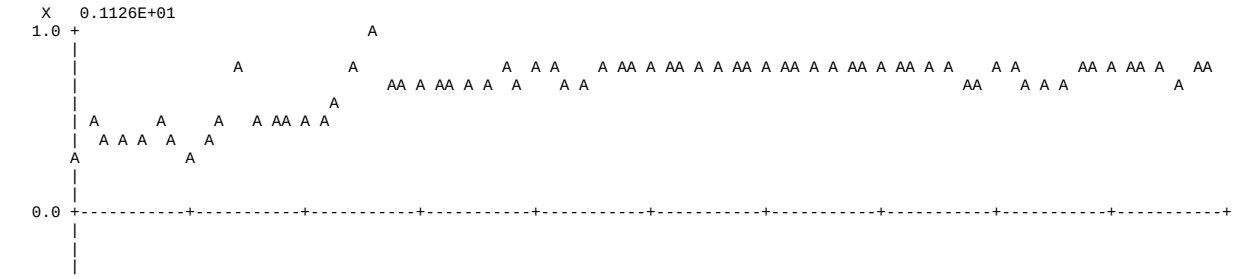
LAYER	DEV01	DEV02	DEV03	DEV04	DEV05	DEV06	DEV07	DEV08	DEV09
1	0.07358	0.26541	0.01000	0.02643	0.05898	0.12286	0.01012	0.04929	0.07236
2	1.00000	1.00001	1.00008	1.12671	1.05599	1.00000	1.10190	1.07994	1.00000
3	0.01911	0.26115	0.11265	0.03065	0.04353	0.02286	0.03678	0.02338	0.02117
4	0.05558	0.05000	0.06289	0.07640	0.06274	0.06294	0.05000	0.06700	0.07995

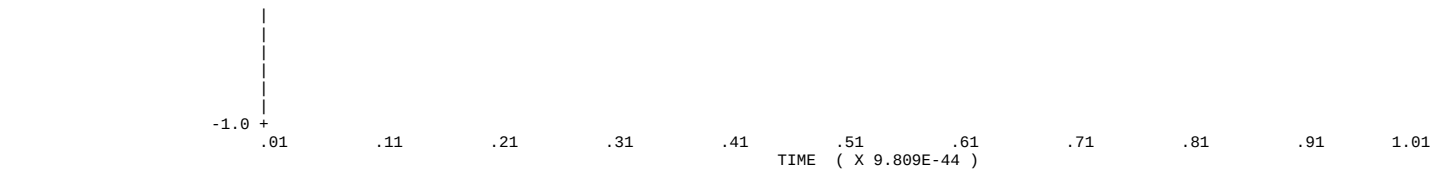
THE ORIGINAL OBJECTIVE FUNCTION = 296.8656311

THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.8874019

THE TOTAL OPTIMAL WEIGHT = 4.03060289E+04

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES





OPTIMAL STRUCTURES OF TPS FOR PATCH = 24
(WITH AVERAGE THICKNESS)

HRSI COAT	thin skin	0.07656 in.	1392.0 F i
LI-900 (P)	slab	1.04051 in.	1392.0 F i
RTV-560	thin skin	0.06348 in.	550.3 F i
17 LB SIP .16 IN	slab	0.06306 in.	550.3 F i

THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH = 24

PANEL	LAYER01		LAYER02		LAYER03		LAYER04	
795	0.11343	805.44	1.00152	805.44	0.01411	550.33	0.06602	465.80
796	0.12068	759.89	1.00019	759.89	0.01836	550.33	0.06415	441.15
797	0.12286	710.55	1.00000	710.55	0.02286	550.33	0.06294	415.94
798	0.11807	678.74	0.99991	678.74	0.03050	534.94	0.06148	388.43
799	0.11017	647.87	0.99982	647.87	0.04033	515.05	0.06050	358.64
800	0.09887	617.87	0.99979	617.87	0.05211	490.73	0.06001	326.77
801	0.08373	589.02	0.99982	589.02	0.06555	462.04	0.06000	293.11
802	0.06427	562.00	0.99991	562.00	0.08036	429.06	0.06049	257.93
803	0.03989	537.61	1.00002	537.61	0.09618	391.89	0.06145	221.57
804	0.01000	516.87	1.00008	516.87	0.11265	350.62	0.06289	184.38
805	0.06826	927.57	1.02571	927.57	0.01439	550.33	0.06283	483.01
806	0.07831	915.54	1.01881	915.54	0.02573	550.33	0.06019	454.54
807	0.09124	891.75	1.01282	891.75	0.04193	550.18	0.05787	420.54
808	0.10469	867.23	1.00958	867.23	0.06352	533.45	0.05595	383.54
809	0.12165	831.20	1.00664	831.20	0.09012	511.94	0.05439	341.13
810	0.14184	783.80	1.00410	783.80	0.12164	485.59	0.05319	293.33
811	0.16488	725.27	1.00207	725.27	0.15796	454.34	0.05236	240.21
812	0.19030	656.06	1.00065	656.06	0.19893	418.09	0.05192	181.88
813	0.21751	576.69	0.99994	576.69	0.24434	376.79	0.05192	167.42
814	0.24580	516.87	1.00004	487.92	0.29391	330.38	0.05238	167.42
815	0.03621	1041.14	1.07234	1041.14	0.02122	550.33	0.06527	513.09
816	0.04536	1023.04	1.06441	1023.04	0.02987	550.33	0.06421	493.01
817	0.05898	999.28	1.05597	999.28	0.04353	550.32	0.06274	467.04
818	0.07470	972.90	1.05073	972.90	0.06109	539.07	0.06166	440.57
819	0.09481	937.86	1.04433	937.86	0.08261	524.72	0.06031	409.34
820	0.11940	894.38	1.03683	894.38	0.10837	507.09	0.05869	372.99
821	0.14859	842.29	1.02841	842.29	0.13869	485.93	0.05679	331.09
822	0.18255	781.05	1.01927	781.05	0.17397	460.89	0.05466	283.18
823	0.22144	709.90	1.00969	709.90	0.21464	431.60	0.05237	228.79
824	0.26541	627.81	1.00001	627.81	0.26115	397.61	0.05000	167.42
825	0.01839	1139.76	1.13141	1139.76	0.03315	550.33	0.07167	549.31
826	0.02210	1088.62	1.13085	1088.62	0.03195	550.33	0.07464	550.19
827	0.02643	1044.64	1.12671	1044.64	0.03065	550.33	0.07640	550.28
828	0.03132	1008.08	1.11910	1008.08	0.02928	550.33	0.07695	549.62
829	0.03683	978.37	1.10799	978.37	0.02782	550.33	0.07633	548.19
830	0.04296	955.52	1.09338	955.52	0.02626	550.33	0.07453	546.00
831	0.04969	939.53	1.07528	939.53	0.02461	550.33	0.07156	543.05
832	0.05704	930.39	1.05368	930.39	0.02287	550.33	0.06741	539.34
833	0.06500	928.11	1.02859	928.11	0.02104	550.33	0.06208	534.87
834	0.07358	932.69	1.00000	932.69	0.01911	550.33	0.05558	529.64
875	0.07358	932.69	1.00000	932.69	0.01911	550.33	0.05558	529.64
876	0.26527	628.17	1.00001	628.17	0.26093	397.79	0.05000	167.80
877	0.24959	516.87	1.00004	489.72	0.29607	331.15	0.05218	167.42
878	0.02074	516.87	1.00008	513.36	0.12164	348.64	0.06244	176.31
882	0.07358	932.69	1.00000	932.69	0.01911	550.33	0.05558	529.64
883	0.26176	636.88	1.00001	636.88	0.25544	402.10	0.05007	177.25
884	0.26541	627.81	1.00001	627.81	0.26115	397.61	0.05000	167.42
885	0.04731	516.87	1.00007	505.12	0.14374	343.95	0.06130	167.42
889	0.07358	932.69	1.00000	932.69	0.01911	550.33	0.05558	529.64
890	0.25221	658.45	1.00001	658.45	0.24125	412.80	0.05028	201.04
891	0.26541	627.81	1.00001	627.81	0.26115	397.61	0.05000	167.42
892	0.07861	516.87	1.00007	496.36	0.16946	338.88	0.05996	167.42
896	0.07358	932.69	1.00000	932.69	0.01911	550.33	0.05558	529.64
897	0.22926	703.18	1.00001	703.18	0.20952	435.07	0.05086	251.80
898	0.26541	627.81	1.00001	627.81	0.26115	397.61	0.05000	167.42
899	0.26541	627.81	1.00001	627.81	0.26115	397.61	0.05000	167.42
903	0.07358	932.69	1.00000	932.69	0.01911	550.33	0.05558	529.64
904	0.17851	786.43	1.00000	786.43	0.14461	476.73	0.05231	349.97
905	0.26541	627.81	1.00001	627.81	0.26115	397.61	0.05000	167.42
906	0.26541	627.81	1.00001	627.81	0.26115	397.61	0.05000	167.42
910	0.07358	932.69	1.00000	932.69	0.01911	550.33	0.05558	529.64
911	0.17093	797.85	1.00000	797.85	0.13526	482.46	0.05254	363.71
912	0.26541	627.81	1.00001	627.81	0.26115	397.61	0.05000	167.42
913	0.26541	627.81	1.00001	627.81	0.26115	397.61	0.05000	167.42
917	0.07358	932.69	1.00000	932.69	0.01911	550.33	0.05558	529.64

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     918   0.21580    726.75   1.00000    726.75   0.19180    446.84   0.05123    279.18
     919   0.26541    627.81   1.00001    627.81   0.26115    397.61   0.05000    167.42
     920   0.26541    627.81   1.00001    627.81   0.26115    397.61   0.05000    167.42
     924   0.07358    932.69   1.00000    932.69   0.01911    550.33   0.05558    529.64
     925   0.23076    700.45   1.00001    700.45   0.21153    433.70   0.05082    248.65
     926   0.26541    627.81   1.00001    627.81   0.26115    397.61   0.05000    167.42
     927   0.26541    627.81   1.00001    627.81   0.26115    397.61   0.05000    167.42
     931   0.07358    932.69   1.00000    932.69   0.01911    550.33   0.05558    529.64
     932   0.22394    712.66   1.00000    712.66   0.20246    439.80   0.05101    262.77
     933   0.26541    627.81   1.00001    627.81   0.26115    397.61   0.05000    167.42
     934   0.26541    627.81   1.00001    627.81   0.26115    397.61   0.05000    167.42
    1309   0.10632    835.08   1.00319    835.08   0.01172    550.33   0.06817    484.46
    1310   0.06285    927.76   1.03164    927.76   0.00888    550.33   0.06517    501.77
    1311   0.03209   1052.45   1.07786   1052.45   0.01764    550.33   0.06567    524.91
    1312   0.01588   1185.64   1.12928   1185.64   0.03404    550.33   0.06843    548.04
    1316   0.10139    853.65   1.00420    853.65   0.01125    550.33   0.07022    497.18
    1317   0.06067    921.76   1.03616    921.76   0.00694    550.33   0.06707    513.39
    1318   0.03093   1058.75   1.08109   1058.75   0.01670    550.33   0.06568    531.30
    1319   0.01429   1222.23   1.12625   1222.23   0.03465    550.33   0.06556    546.80
    1323   0.09571    871.68   1.00522    871.68   0.01190    550.33   0.07242    508.56
    1324   0.06008    911.06   1.04071    911.06   0.00700    550.33   0.06905    522.66
    1325   0.03144   1062.49   1.08337   1062.49   0.01710    550.33   0.06545    535.66
    1326   0.01293   1261.08   1.12200   1261.08   0.03523    550.33   0.06229    545.29
    1330   0.08935    889.96   1.00604    889.96   0.01368    550.33   0.07479    518.66
    1331   0.06126    895.10   1.04498    895.10   0.00898    550.33   0.07116    529.63
    1332   0.03380   1061.19   1.08445   1061.19   0.01861    550.33   0.06510    538.15
    1333   0.01178   1302.24   1.11654   1302.24   0.03578    550.33   0.05861    543.52
    1337   0.08180    909.18   1.00687    909.18   0.01649    550.33   0.07734    527.84
    1338   0.06398    874.32   1.04919    874.32   0.01291    550.33   0.07344    534.56
    1339   0.03804   1053.86   1.08473   1053.86   0.02131    550.33   0.06476    539.04
    1340   0.01084   1345.85   1.10984   1345.85   0.03629    550.33   0.05452    541.48
    1344   0.07236    963.89   1.00000    963.89   0.02117    550.33   0.07995    535.59
    1345   0.07001    844.01   1.04691    844.01   0.01811    550.33   0.07693    537.17
    1346   0.04929    989.29   1.07994    989.29   0.02338    550.33   0.06700    538.33
    1347   0.01012   1391.98   1.10190   1391.98   0.03678    550.33   0.05000    539.17

                  OPTIMIZATION SYSTEM FOR TPSSYM =    25


 TOTAL NUMBER OF DESIGN VARIABLES =   36
 TOTAL NUMBER OF CONSTRAINS       =  996
 TOTAL NUMBER OF TEMP. CONSTRAINS =  468
 TOTAL NUMBER OF TEMP. PRINTOUTS  =   13


MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
    X   0.9353E+03
   1.0 B         B         B         B
       |                                       B         B
       |                                                 B         B
       D         D         D                                       B         B         B         B
       |                             D         D                                                 A
       |                                       D         D
       |                                                 D         D                       A
       |                                                                   D
       |                                                                             D         D
   0.0 +-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+
       |
       |
       |
       |
       |
       |
       |
       |
       |
       |
  -1.0 +
       .08         .18         .28         .38         .48         .58         .68         .78         .88         .98        1.08
                                                          TIME  ( X 1.401E-44 )


              MAXIMUM TEMPERATURE OF EVERY LAYER
LAYER:        1         2         3         4
Tmax:    2300.33   2300.33    550.33    600.33
Optv:     935.32    935.32    550.25    550.45

                   VALUES OF DESIGN VARIABLES :
LAYER    DEV01     DEV02     DEV03     DEV04     DEV05     DEV06     DEV07     DEV08     DEV09
    1  0.01000   0.01000   0.01000   0.01000   0.01000   0.01000   0.01000   0.01000   0.01000
    2  1.00000   1.00000   1.00000   1.00000   1.00000   1.00000   1.00000   1.00000   1.00000
    3  0.04250   0.04251   0.04257   0.06100   0.06097   0.06098   0.02060   0.01733   0.01300
    4  0.05000   0.05000   0.05000   0.05000   0.05000   0.05000   0.05000   0.05000   0.05000

 THE ORIGINAL OBJECTIVE FUNCTION =     222.6508484

 THE RATIO OF OPTIMAL OBJECTIVE FUNCTION =   0.4192527

 THE TOTAL OPTIMAL WEIGHT = 1.55442568E+04
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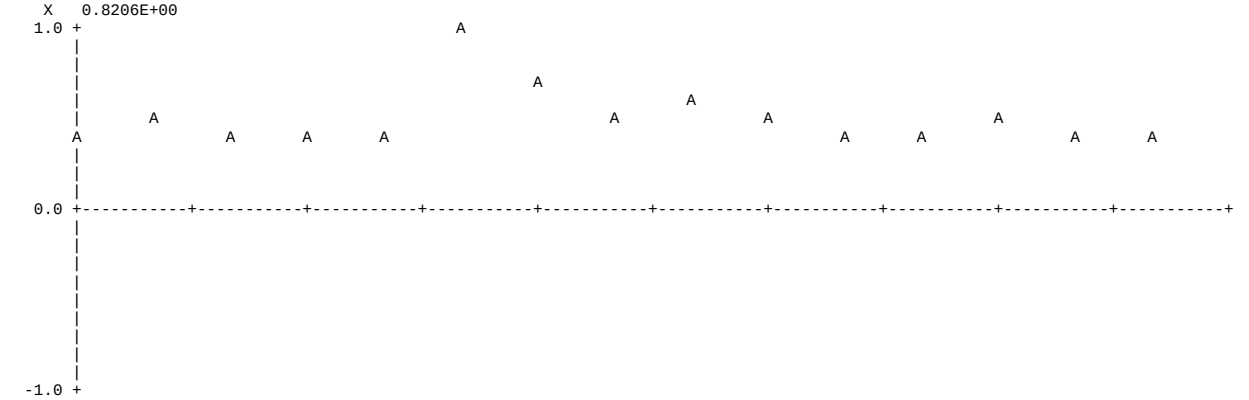
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



OPTIMAL STRUCTURES OF TPS FOR PATCH = 25
(WITH AVERAGE THICKNESS)

HRSI COAT	thin skin	0.01000 in.	935.3 F
			i
LI-900 (P)	slab	1.00000 in.	935.3 F
			i
RTV-560	thin skin	0.04016 in.	550.3 F
			i
17 LB SIP .16 IN	slab	0.05000 in.	550.5 F
			i

THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH = 25

PANEL	LAYER01		LAYER02		LAYER03		LAYER04	
765	0.01000	683.27	1.00001	683.27	0.05169	459.74	0.05000	323.72
766	0.01000	629.03	1.00001	629.03	0.05709	435.54	0.05000	281.31
767	0.01000	579.29	1.00000	579.29	0.06098	412.64	0.05000	245.98
768	0.01000	541.05	1.00000	541.05	0.06324	395.19	0.05000	220.00
769	0.01000	508.76	1.00000	508.76	0.06386	379.28	0.05000	209.23
770	0.01000	482.42	1.00000	482.42	0.06286	364.92	0.05000	209.23
771	0.01000	462.04	1.00000	462.04	0.06023	352.10	0.05000	209.23
772	0.01000	447.60	1.00000	447.60	0.05597	340.82	0.05000	209.23
773	0.01000	439.11	1.00000	439.11	0.05008	331.09	0.05000	209.23
774	0.01000	436.58	1.00000	436.58	0.04257	322.90	0.05000	209.23
775	0.01000	724.22	1.00002	724.22	0.05256	489.89	0.05000	340.62
776	0.01000	676.19	1.00002	676.19	0.05749	469.14	0.05000	299.81
777	0.01000	631.10	1.00003	631.10	0.06097	448.15	0.05000	265.21
778	0.01000	595.60	1.00003	595.60	0.06292	431.53	0.05000	239.52
779	0.01000	563.69	1.00002	563.69	0.06335	415.22	0.05000	220.17
780	0.01000	535.36	1.00002	535.36	0.06224	399.22	0.05000	209.23
781	0.01000	510.59	1.00002	510.59	0.05960	383.50	0.05000	209.23
782	0.01000	489.31	1.00001	489.31	0.05543	368.02	0.05000	209.23
783	0.01000	471.44	1.00001	471.44	0.04974	352.74	0.05000	209.23
784	0.01000	456.88	1.00000	456.88	0.04251	337.57	0.05000	218.26
785	0.01000	770.07	1.00000	770.07	0.05315	519.58	0.05000	357.62
786	0.01000	733.09	1.00000	733.09	0.05781	507.92	0.05000	322.03
787	0.01000	697.50	1.00000	697.50	0.06100	494.70	0.05000	291.90
788	0.01000	663.64	1.00000	663.64	0.06270	480.10	0.05000	267.45
789	0.01000	631.11	1.00000	631.11	0.06295	463.97	0.05000	248.33
790	0.01000	599.93	1.00000	599.93	0.06175	446.33	0.05000	234.53
791	0.01000	570.09	1.00000	570.09	0.05911	427.17	0.05000	226.05
792	0.01000	541.60	1.00000	541.60	0.05502	406.50	0.05000	222.90
793	0.01000	514.44	1.00000	514.44	0.04948	384.31	0.05000	225.07
794	0.01000	488.61	1.00000	488.61	0.04250	360.59	0.05000	232.57
879	0.01000	488.61	1.00000	488.61	0.04250	360.59	0.05000	232.57
880	0.01000	457.68	1.00000	457.68	0.04251	338.15	0.05000	218.62
881	0.01000	436.99	1.00000	436.99	0.04257	323.20	0.05000	209.41
886	0.01000	488.61	1.00000	488.61	0.04250	360.59	0.05000	232.57
887	0.01000	459.30	1.00000	459.30	0.04251	339.32	0.05000	219.35
888	0.01000	456.88	1.00000	456.88	0.04251	337.57	0.05000	218.26
893	0.01000	488.61	1.00000	488.61	0.04250	360.59	0.05000	232.57
894	0.01000	461.20	1.00000	461.20	0.04251	340.70	0.05000	220.20
895	0.01000	456.88	1.00000	456.88	0.04251	337.57	0.05000	218.26
900	0.01000	488.61	1.00000	488.61	0.04250	360.59	0.05000	232.57
901	0.01000	463.67	1.00000	463.67	0.04251	342.49	0.05000	221.31
902	0.01000	456.88	1.00000	456.88	0.04251	337.57	0.05000	218.26
907	0.01000	488.61	1.00000	488.61	0.04250	360.59	0.05000	232.57
908	0.01000	466.82	1.00000	466.82	0.04250	344.77	0.05000	222.73
909	0.01000	456.88	1.00000	456.88	0.04251	337.57	0.05000	218.26
914	0.01000	488.61	1.00000	488.61	0.04250	360.59	0.05000	232.57
915	0.01000	466.69	1.00000	466.69	0.04251	344.68	0.05000	222.67
916	0.01000	456.88	1.00000	456.88	0.04251	337.57	0.05000	218.26

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     921   0.01000    488.61   1.00000    488.61   0.04250    360.59   0.05000    232.57
     922   0.01000    463.84   1.00000    463.84   0.04251    342.61   0.05000    221.39
     923   0.01000    456.88   1.00000    456.88   0.04251    337.57   0.05000    218.26
     928   0.01000    488.61   1.00000    488.61   0.04250    360.59   0.05000    232.57
     929   0.01000    462.71   1.00000    462.71   0.04251    341.80   0.05000    220.88
     930   0.01000    456.88   1.00000    456.88   0.04251    337.57   0.05000    218.26
     935   0.01000    488.61   1.00000    488.61   0.04250    360.59   0.05000    232.57
     936   0.01000    463.41   1.00000    463.41   0.04251    342.30   0.05000    221.19
     937   0.01000    456.88   1.00000    456.88   0.04251    337.57   0.05000    218.26
    1306   0.01000    728.66   1.00001    728.66   0.04612    478.73   0.05000    362.67
    1307   0.01000    763.90   1.00002    763.90   0.04745    505.33   0.05000    377.90
    1308   0.01000    801.39   1.00000    801.39   0.04822    527.99   0.05000    390.84
    1313   0.01000    763.99   1.00001    763.99   0.04099    492.13   0.05000    394.98
    1314   0.01000    793.36   1.00001    793.36   0.04278    515.41   0.05000    408.53
    1315   0.01000    826.10   1.00000    826.10   0.04375    533.74   0.05000    418.88
    1320   0.01000    801.25   1.00001    801.25   0.03519    505.77   0.05000    429.73
    1321   0.01000    822.28   1.00001    822.28   0.03755    524.43   0.05000    440.69
    1322   0.01000    850.91   1.00000    850.91   0.03879    538.79   0.05000    448.53
    1327   0.01000    841.02   1.00000    841.02   0.02869    519.84   0.05000    467.03
    1328   0.01000    851.23   1.00001    851.23   0.03170    532.80   0.05000    474.72
    1329   0.01000    875.99   1.00000    875.99   0.03332    543.20   0.05000    479.95
    1334   0.01000    884.29   1.00000    884.29   0.02143    534.80   0.05000    507.32
    1335   0.01000    881.61   1.00000    881.61   0.02509    541.32   0.05000    511.56
    1336   0.01000    901.89   1.00000    901.89   0.02723    547.07   0.05000    513.81
    1341   0.01000    935.32   1.00000    935.32   0.01300    550.33   0.05000    548.72
    1342   0.01000    913.52   1.00000    913.52   0.01733    550.33   0.05000    550.45
    1343   0.01000    928.15   1.00000    928.15   0.02060    550.33   0.05000    549.54

                  OPTIMIZATION SYSTEM FOR TPSSYM =    26


TOTAL NUMBER OF DESIGN VARIABLES =   36
 TOTAL NUMBER OF CONSTRAINS       = 1228
 TOTAL NUMBER OF TEMP. CONSTRAINS =  468
 TOTAL NUMBER OF TEMP. PRINTOUTS  =   13


MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
    X   0.9040E+03
   1.0 B
       |         B
       |                   B
       |                             B         B         B
       D         D         D                             A         B         B         B         B         B
       |                             D         D         D                             A         A         A         B
       |                                                                 D
       |                                                                           D         D                   A
       |                                                                                               D
       |                                                                                                     D         D
   0.0 +-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+
       |
       |
       |
       |
       |
       |
       |
       |
       |
  -1.0 +
       .08         .18         .28         .38         .48         .58         .68         .78         .88         .98        1.08
                                                                  TIME  ( X 1.401E-44 )


              MAXIMUM TEMPERATURE OF EVERY LAYER
LAYER:        1         2         3         4
Tmax:   2300.33  2300.33   550.33   600.33
Optv:    903.96   903.96   545.54   545.54

                   VALUES OF DESIGN VARIABLES :
LAYER    DEV01    DEV02    DEV03    DEV04    DEV05    DEV06    DEV07    DEV08    DEV09
    1  0.01000  0.01000  0.01000  0.01000  0.01000  0.01000  0.01000  0.01000  0.01000
    2  1.00000  1.00000  1.00000  1.00000  1.00000  1.00000  1.00000  1.00000  1.00000
    3  0.00100  0.00100  0.00100  0.00100  0.00100  0.00100  0.00100  0.00100  0.00100
    4  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000

 THE ORIGINAL OBJECTIVE FUNCTION =     308.7772827

 THE RATIO OF OPTIMAL OBJECTIVE FUNCTION =   0.3081630

 THE TOTAL OPTIMAL WEIGHT = 1.59605106E+04


MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
    X   0.5763E+01
   1.0 +                A
       |
       |
       |
       |
       |                                  A               A               A
       |
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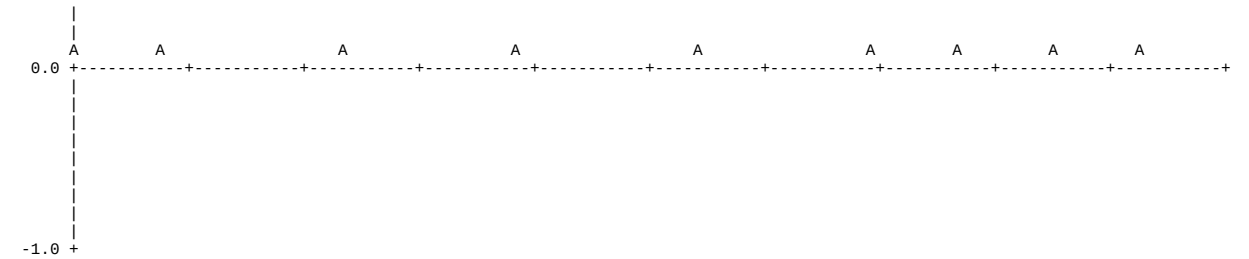


OPTIMAL STRUCTURES OF TPS FOR PATCH = 26
(WITH AVERAGE THICKNESS)

HRSI COAT	thin skin	0.01000 in.	904.0 F
LI-900 (P)	slab	1.00007 in.	904.0 F
RTV-560	thin skin	0.00100 in.	545.5 F
17 LB SIP .16 IN	slab	0.05000 in.	545.5 F

THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH = 26

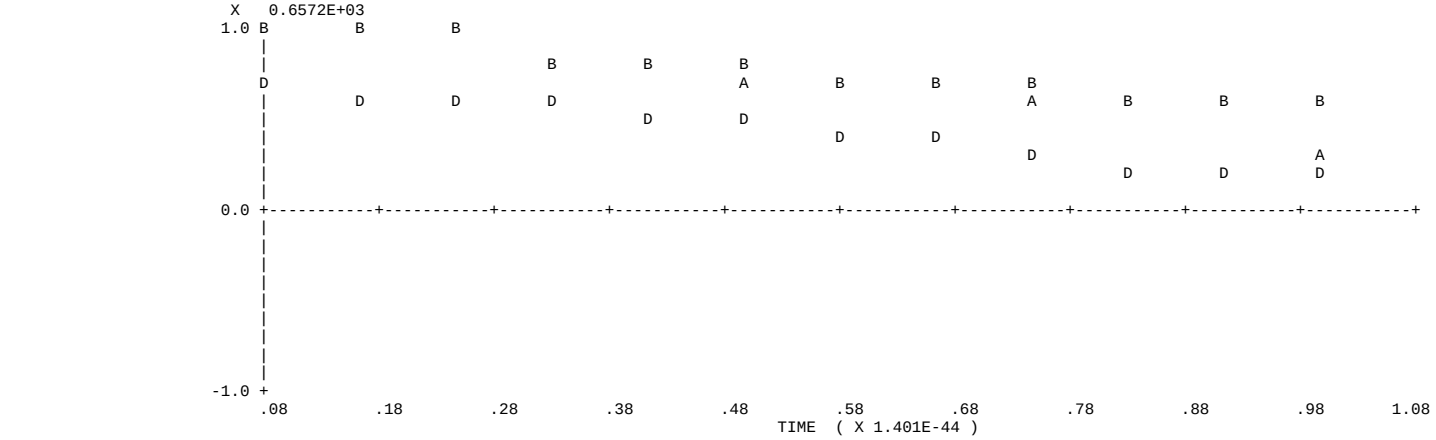
PANEL	LAYER01		LAYER02		LAYER03		LAYER04	
1918	0.01000	686.12	1.00000	686.12	0.00100	550.33	0.05000	444.39
1394	0.01000	336.50	1.00000	336.50	0.00100	273.86	0.05000	211.23
1395	0.01000	356.35	1.00000	356.35	0.00100	289.53	0.05000	222.86
1396	0.01000	383.16	1.00000	383.16	0.00100	311.29	0.05000	239.77
1397	0.01000	416.85	1.00000	416.85	0.00100	339.06	0.05000	261.89
1402	0.01000	366.75	1.00000	366.75	0.00100	299.28	0.05000	231.30
1403	0.01000	384.68	1.00019	384.68	0.00100	312.66	0.05001	241.58
1404	0.01000	401.99	1.00018	401.99	0.00100	331.59	0.05001	253.35
1405	0.01000	418.89	1.00000	418.89	0.00100	355.78	0.05000	266.59
1410	0.01000	396.29	1.00000	396.29	0.00100	324.00	0.05000	250.92
1411	0.01000	411.99	1.00035	411.99	0.00100	335.19	0.05002	259.75
1412	0.01000	421.89	1.00033	421.89	0.00100	351.47	0.05002	267.42
1413	0.01000	426.81	1.00000	426.81	0.00100	372.43	0.05000	274.14
1418	0.01000	425.10	1.00001	425.10	0.00100	348.04	0.05000	270.07
1419	0.01000	438.38	1.00047	438.38	0.00100	357.15	0.05002	277.43
1420	0.01000	443.11	1.00045	443.11	0.00100	370.95	0.05002	282.09
1421	0.01000	440.61	1.00000	440.61	0.00100	388.99	0.05000	284.53
1426	0.01000	453.19	1.00001	453.19	0.00100	371.41	0.05000	288.77
1427	0.01001	463.95	1.00057	463.95	0.00100	378.57	0.05003	294.67
1428	0.01001	465.82	1.00054	465.82	0.00100	390.08	0.05003	297.47
1429	0.01000	460.31	1.00000	460.31	0.00100	405.46	0.05000	297.76
1434	0.01000	480.54	1.00001	480.54	0.00100	394.10	0.05000	307.01
1435	0.01001	488.75	1.00063	488.75	0.00100	399.48	0.05003	311.49
1436	0.01001	490.13	1.00060	490.13	0.00100	408.87	0.05003	313.61
1437	0.01000	485.88	1.00000	485.88	0.00100	421.86	0.05000	313.83
1442	0.01000	507.20	1.00000	507.20	0.00100	416.12	0.05000	324.81
1443	0.01001	512.82	1.00066	512.82	0.00100	419.92	0.05003	327.93
1444	0.01001	516.04	1.00063	516.04	0.00100	427.36	0.05003	330.51
1445	0.01000	517.35	1.00000	517.35	0.00100	438.17	0.05000	332.75
1450	0.01000	533.17	1.00000	533.17	0.00100	437.48	0.05000	342.17
1451	0.01001	536.12	1.00066	536.12	0.00100	439.90	0.05003	343.98
1452	0.01001	543.43	1.00063	543.43	0.00100	445.57	0.05003	348.14
1453	0.01000	554.70	1.00000	554.70	0.00100	454.39	0.05000	354.50
1458	0.01000	558.46	1.00000	558.46	0.00100	458.17	0.05000	359.08
1459	0.01001	558.65	1.00062	558.65	0.00100	459.52	0.05003	359.63
1460	0.01001	572.84	1.00060	572.84	0.00100	463.87	0.05003	366.81
1461	0.01000	598.43	1.00000	598.43	0.00100	470.71	0.05000	379.38
1466	0.01000	583.02	1.00000	583.02	0.00100	478.15	0.05000	375.53
1467	0.01001	580.28	1.00055	580.28	0.00100	478.75	0.05003	374.83
1468	0.01001	605.09	1.00053	605.09	0.00100	482.03	0.05003	386.84
1469	0.01000	648.31	1.00000	648.31	0.00100	486.99	0.05000	407.24
1470	0.01000	903.96	1.00000	903.96	0.00100	550.33	0.05000	545.54
1471	0.01000	686.12	1.00000	686.12	0.00100	550.33	0.05000	444.39
1472	0.01000	672.91	1.00000	672.91	0.00100	550.33	0.05000	435.95
1473	0.01000	672.91	1.00000	672.91	0.00100	550.33	0.05000	435.95
1478	0.01000	858.41	1.00000	858.41	0.00100	540.65	0.05000	521.25
1479	0.01000	690.70	1.00013	690.70	0.00100	539.89	0.05001	443.55
1480	0.01000	644.11	1.00007	644.11	0.00100	539.77	0.05000	420.66
1481	0.01000	659.79	1.00000	659.79	0.00100	539.91	0.05000	427.11
1486	0.01000	813.75	1.00000	813.75	0.00100	530.63	0.05000	497.33
1487	0.01000	677.34	1.00024	677.34	0.00100	529.15	0.05001	434.16
1488	0.01000	631.67	1.00016	631.67	0.00100	528.75	0.05001	412.07
1489	0.01000	646.12	1.00000	646.12	0.00100	529.00	0.05000	417.91
1494	0.01000	771.25	1.00000	771.25	0.00100	520.52	0.05000	474.42
1495	0.01000	662.80	1.00034	662.80	0.00100	518.21	0.05002	424.18
1496	0.01000	620.07	1.00027	620.07	0.00100	517.32	0.05001	403.67
1497	0.01000	631.86	1.00000	631.86	0.00100	517.58	0.05000	408.31
1502	0.01000	731.15	1.00000	731.15	0.00100	510.37	0.05000	452.69

1503	0.01000	647.60	1.00041	647.60	0.00100	507.28	0.05002	413.90
1504	0.01000	608.55	1.00037	608.55	0.00100	505.75	0.05002	395.24
1505	0.01000	617.31	1.00000	617.31	0.00100	505.88	0.05000	398.54
1510	0.01000	693.47	1.00000	693.47	0.00100	500.19	0.05000	432.12
1511	0.01000	631.49	1.00046	631.49	0.00100	496.43	0.05002	403.23
1512	0.01000	596.79	1.00046	596.79	0.00100	494.08	0.05002	386.64
1513	0.01000	602.52	1.00000	602.52	0.00100	493.95	0.05000	388.61
1518	0.01000	416.85	1.00000	416.85	0.00100	339.06	0.05000	261.89
1519	0.01000	383.16	1.00000	383.16	0.00100	311.29	0.05000	239.77
1520	0.01000	356.33	1.00000	356.33	0.00100	289.52	0.05000	222.85
1521	0.01000	336.51	1.00000	336.51	0.00100	273.88	0.05000	211.24
1526	0.01000	416.85	1.00000	416.85	0.00100	339.06	0.05000	261.89
1527	0.01000	383.16	1.00000	383.16	0.00100	311.29	0.05000	239.77
1528	0.01000	357.19	1.00000	357.19	0.00100	290.21	0.05000	223.38
1529	0.01000	336.92	1.00000	336.92	0.00100	274.19	0.05000	211.46
1534	0.01000	416.85	1.00000	416.85	0.00100	339.06	0.05000	261.89
1535	0.01000	383.24	1.00000	383.24	0.00100	311.35	0.05000	239.82
1536	0.01000	358.40	1.00000	358.40	0.00100	291.18	0.05000	224.12
1537	0.01000	337.65	1.00000	337.65	0.00100	274.75	0.05000	211.86
1542	0.01000	416.85	1.00000	416.85	0.00100	339.06	0.05000	261.89
1543	0.01000	384.72	1.00000	384.72	0.00100	312.57	0.05000	240.78
1544	0.01000	383.16	1.00000	383.16	0.00100	311.29	0.05000	239.77
1545	0.01000	338.16	1.00000	338.16	0.00100	275.15	0.05000	212.15
1550	0.01000	416.85	1.00000	416.85	0.00100	339.06	0.05000	261.89
1551	0.01000	387.26	1.00000	387.26	0.00100	314.65	0.05000	242.42
1552	0.01000	383.16	1.00000	383.16	0.00100	311.29	0.05000	239.77
1553	0.01000	338.48	1.00000	338.48	0.00100	275.40	0.05000	212.33
1558	0.01000	416.85	1.00000	416.85	0.00100	339.06	0.05000	261.89
1559	0.01000	387.13	1.00000	387.13	0.00100	314.54	0.05000	242.34
1560	0.01000	383.16	1.00000	383.16	0.00100	311.29	0.05000	239.77
1561	0.01000	337.59	1.00000	337.59	0.00100	274.71	0.05000	211.83
1566	0.01000	416.85	1.00000	416.85	0.00100	339.06	0.05000	261.89
1567	0.01000	384.48	1.00000	384.48	0.00100	312.36	0.05000	240.62
1568	0.01000	383.16	1.00000	383.16	0.00100	311.29	0.05000	239.77
1569	0.01000	336.50	1.00000	336.50	0.00100	273.86	0.05000	211.23
1574	0.01000	416.85	1.00000	416.85	0.00100	339.06	0.05000	261.89
1575	0.01000	384.20	1.00000	384.20	0.00100	312.14	0.05000	240.45
1576	0.01000	383.16	1.00000	383.16	0.00100	311.29	0.05000	239.77
1577	0.01000	336.50	1.00000	336.50	0.00100	273.86	0.05000	211.23
1582	0.01000	416.85	1.00000	416.85	0.00100	339.06	0.05000	261.89
1583	0.01000	386.10	1.00000	386.10	0.00100	313.70	0.05000	241.67
1584	0.01000	383.16	1.00000	383.16	0.00100	311.29	0.05000	239.77
1585	0.01000	337.65	1.00000	337.65	0.00100	274.76	0.05000	211.87
1919	0.01000	655.52	1.00000	655.52	0.00100	550.33	0.05000	429.51
1920	0.01000	672.91	1.00000	672.91	0.00100	550.33	0.05000	435.95
1921	0.01000	672.91	1.00000	672.91	0.00100	550.33	0.05000	435.95

OPTIMIZATION SYSTEM FOR TPSSYM = 27

TOTAL NUMBER OF DESIGN VARIABLES = 36
TOTAL NUMBER OF CONSTRAINS = 1228
TOTAL NUMBER OF TEMP. CONSTRAINS = 468
TOTAL NUMBER OF TEMP. PRINTOUTS = 13

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



MAXIMUM TEMPERATURE OF EVERY LAYER

LAYER:	1	2	3	4
Tmax:	2300.33	2300.33	550.33	600.33
Optv:	657.20	657.20	427.54	427.98

VALUES OF DESIGN VARIABLES :

LAYER	DEV01	DEV02	DEV03	DEV04	DEV05	DEV06	DEV07	DEV08	DEV09
1	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000
2	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
3	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100

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   4  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000

 THE ORIGINAL OBJECTIVE FUNCTION =     308.7394409

 THE RATIO OF OPTIMAL OBJECTIVE FUNCTION =   0.3081630

 THE TOTAL OPTIMAL WEIGHT = 1.62614041E+04


 OBJECTIVE FUNCTION VS ITERATIONS :
          1  0.3081630
          2  0.3081630


MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
    X   0.3082E+00
   1.0 A
       |
       |
       |
       |
       |
       |
       |
       |
       |
       |
   0.0 +-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+
       |
       |
       |
       |
       |
       |
       |
       |
       |
       |
  -1.0 +
       1.00        1.10        1.20        1.30        1.40        1.50        1.60        1.70        1.80        1.90      2.00
                                                              TIME  ( X 0.000E+00 )

              OPTIMAL STRUCTURES OF TPS FOR PATCH =      27
                    (WITH AVERAGE THICKNESS)
 ============================================================   -----
                       HRSI COAT            thin skin           0.01000 in.   657.2 F
 ============================================================   -----
                                                                  i
                       LI-900 (P)           slab                1.00000 in.   657.2 F
                                                                  i
 ============================================================   -----
                       RTV-560              thin skin           0.00100 in.   427.5 F
 ============================================================   -----
                                                                  i
                       17 LB SIP .16 IN     slab                0.05000 in.   428.0 F
                                                                  i
 ============================================================   -----


         THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =      27

   PANEL   LAYER01            LAYER02            LAYER03            LAYER04
    1932   0.01000    656.55   1.00000    656.55   0.00100    541.81   0.05000    427.51
    1390   0.01000    297.20   1.00000    297.20   0.00100    243.42   0.05000    189.64
    1391   0.01000    301.01   1.00000    301.01   0.00100    246.41   0.05000    191.98
    1392   0.01000    308.10   1.00000    308.10   0.00100    251.87   0.05000    195.82
    1393   0.01000    318.58   1.00000    318.58   0.00100    259.90   0.05000    201.21
    1398   0.01000    333.29   1.00000    333.29   0.00100    272.72   0.05000    212.26
    1399   0.01000    337.99   0.99999    337.99   0.00100    276.51   0.05000    215.28
    1400   0.01000    344.57   0.99999    344.57   0.00100    281.71   0.05000    219.08
    1401   0.01000    353.23   1.00000    353.23   0.00100    288.43   0.05000    223.71
    1406   0.01000    368.00   1.00000    368.00   0.00100    300.99   0.05000    234.18
    1407   0.01000    373.30   0.99998    373.30   0.00100    305.33   0.05000    237.66
    1408   0.01000    379.44   0.99998    379.44   0.00100    310.27   0.05000    241.39
    1409   0.01000    386.45   1.00000    386.45   0.00100    315.82   0.05000    245.34
    1414   0.01000    401.33   1.00000    401.33   0.00100    328.22   0.05000    255.40
    1415   0.01000    406.96   0.99998    406.96   0.00100    332.87   0.05000    259.13
    1416   0.01000    412.65   0.99998    412.65   0.00100    337.54   0.05000    262.76
    1417   0.01000    418.22   1.00000    418.22   0.00100    342.05   0.05000    266.09
    1422   0.01000    433.28   1.00000    433.28   0.00100    354.42   0.05000    275.91
    1423   0.01000    438.99   0.99997    438.99   0.00100    359.16   0.05000    279.72
    1424   0.01000    444.20   0.99997    444.20   0.00100    363.50   0.05000    283.17
    1425   0.01000    448.53   1.00000    448.53   0.00100    367.12   0.05000    285.98
    1430   0.01000    463.84   1.00000    463.84   0.00100    379.58   0.05000    295.73
    1431   0.01000    469.39   0.99997    469.39   0.00100    384.20   0.05000    299.43
    1432   0.01000    474.07   0.99997    474.07   0.00100    388.14   0.05000    302.62
    1433   0.01000    477.38   1.00000    477.38   0.00100    391.02   0.05000    304.98
    1438   0.01000    493.03   1.00000    493.03   0.00100    403.71   0.05000    314.85
    1439   0.01000    498.16   0.99997    498.16   0.00100    407.98   0.05000    318.26
    1440   0.01000    502.24   0.99997    502.24   0.00100    411.46   0.05000    321.11
    1441   0.01000    504.76   1.00000    504.76   0.00100    413.75   0.05000    323.10
    1446   0.01000    520.83   1.00000    520.83   0.00100    426.80   0.05000    333.26
    1447   0.01000    525.27   0.99997    525.27   0.00100    430.49   0.05000    336.19
    1448   0.01000    528.68   0.99997    528.68   0.00100    433.43   0.05000    338.63
    1449   0.01000    530.68   1.00000    530.68   0.00100    435.31   0.05000    340.35
    1454   0.01000    547.26   1.00000    547.26   0.00100    448.86   0.05000    350.98
    1455   0.01000    550.73   0.99997    550.73   0.00100    451.73   0.05000    353.23
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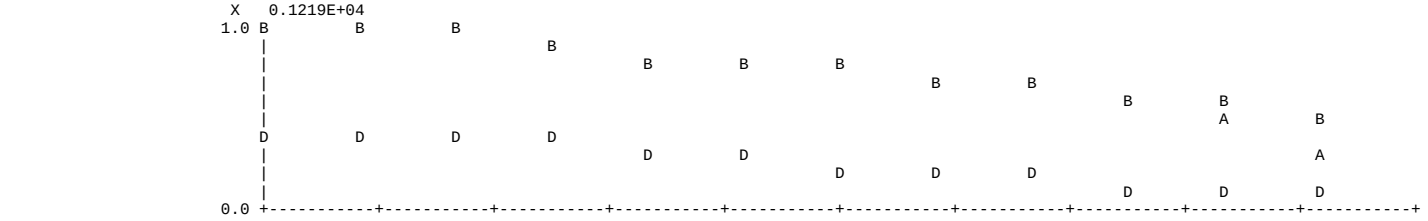
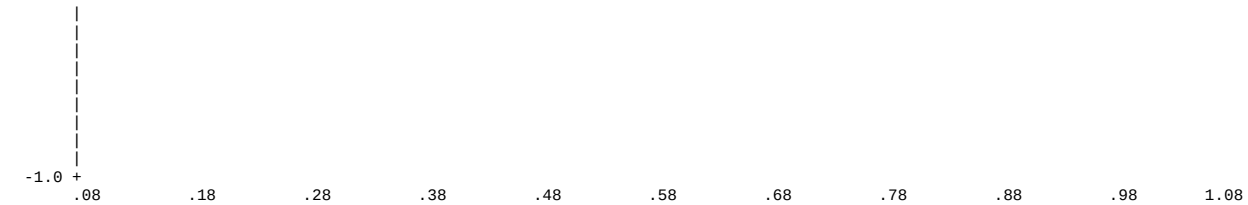
1456	0.01000	553.46	0.99997	553.46	0.00100	454.10	0.05000	355.21
1457	0.01000	555.18	1.00000	555.18	0.00100	455.75	0.05000	356.75
1462	0.01000	572.30	1.00000	572.30	0.00100	469.89	0.05000	368.00
1463	0.01000	574.43	0.99997	574.43	0.00100	471.62	0.05000	369.29
1464	0.01000	576.49	0.99997	576.49	0.00100	473.41	0.05000	370.79
1465	0.01000	578.20	1.00000	578.20	0.00100	475.01	0.05000	372.26
1474	0.01000	654.43	1.00000	654.43	0.00100	539.32	0.05000	424.67
1475	0.01000	649.55	1.00000	649.55	0.00100	535.48	0.05000	421.85
1476	0.01000	650.23	1.00000	650.23	0.00100	536.29	0.05000	422.79
1477	0.01000	657.20	1.00000	657.20	0.00100	542.37	0.05000	427.98
1482	0.01000	644.17	1.00000	644.17	0.00100	530.59	0.05000	417.49
1483	0.01000	640.39	0.99999	640.39	0.00100	527.56	0.05000	415.17
1484	0.01000	639.88	0.99999	639.88	0.00100	527.29	0.05000	415.16
1485	0.01000	644.66	1.00000	644.66	0.00100	531.51	0.05000	418.83
1490	0.01000	633.16	1.00000	633.16	0.00100	521.26	0.05000	409.83
1491	0.01000	629.99	0.99999	629.99	0.00100	518.65	0.05000	407.78
1492	0.01000	629.20	0.99999	629.20	0.00100	518.10	0.05000	407.46
1493	0.01000	632.30	1.00000	632.30	0.00100	520.86	0.05000	409.91
1498	0.01000	621.33	1.00000	621.33	0.00100	511.26	0.05000	401.66
1499	0.01000	618.68	0.99999	618.68	0.00100	509.03	0.05000	399.85
1500	0.01000	617.70	0.99998	617.70	0.00100	508.25	0.05000	399.28
1501	0.01000	619.33	1.00000	619.33	0.00100	509.76	0.05000	400.68
1506	0.01000	608.89	1.00000	608.89	0.00100	500.77	0.05000	393.13
1507	0.01000	606.67	0.99998	606.67	0.00100	498.85	0.05000	391.49
1508	0.01000	605.43	0.99998	605.43	0.00100	497.81	0.05000	390.67
1509	0.01000	605.78	1.00000	605.78	0.00100	498.21	0.05000	391.15
1514	0.01000	595.88	1.00000	595.88	0.00100	489.84	0.05000	384.25
1515	0.01000	593.97	0.99998	593.97	0.00100	488.12	0.05000	382.74
1516	0.01000	592.40	0.99997	592.40	0.00100	486.77	0.05000	381.62
1517	0.01000	591.62	1.00000	591.62	0.00100	486.19	0.05000	381.29
1522	0.01000	318.58	1.00000	318.58	0.00100	259.90	0.05000	201.21
1523	0.01000	308.35	1.00000	308.35	0.00100	252.06	0.05000	195.95
1524	0.01000	301.25	1.00000	301.25	0.00100	246.59	0.05000	192.12
1525	0.01000	297.22	1.00000	297.22	0.00100	243.43	0.05000	189.65
1530	0.01000	318.58	1.00000	318.58	0.00100	259.90	0.05000	201.21
1531	0.01000	308.58	1.00000	308.58	0.00100	252.24	0.05000	196.08
1532	0.01000	301.48	1.00000	301.48	0.00100	246.77	0.05000	192.25
1533	0.01000	297.24	1.00000	297.24	0.00100	243.45	0.05000	189.67
1538	0.01000	318.58	1.00000	318.58	0.00100	259.90	0.05000	201.21
1539	0.01000	308.75	1.00000	308.75	0.00100	252.37	0.05000	196.17
1540	0.01000	301.61	1.00000	301.61	0.00100	246.87	0.05000	192.32
1541	0.01000	297.25	1.00000	297.25	0.00100	243.46	0.05000	189.68
1546	0.01000	318.58	1.00000	318.58	0.00100	259.90	0.05000	201.21
1547	0.01000	308.77	1.00000	308.77	0.00100	252.39	0.05000	196.18
1548	0.01000	301.58	1.00000	301.58	0.00100	246.85	0.05000	192.31
1549	0.01000	297.25	1.00000	297.25	0.00100	243.46	0.05000	189.68
1554	0.01000	318.58	1.00000	318.58	0.00100	259.90	0.05000	201.21
1555	0.01000	308.74	1.00000	308.74	0.00100	252.36	0.05000	196.16
1556	0.01000	301.44	1.00000	301.44	0.00100	246.74	0.05000	192.22
1557	0.01000	297.24	1.00000	297.24	0.00100	243.45	0.05000	189.67
1562	0.01000	318.58	1.00000	318.58	0.00100	259.90	0.05000	201.21
1563	0.01000	308.57	1.00000	308.57	0.00100	252.23	0.05000	196.07
1564	0.01000	301.32	1.00000	301.32	0.00100	246.65	0.05000	192.16
1565	0.01000	297.20	1.00000	297.20	0.00100	243.42	0.05000	189.64
1570	0.01000	318.58	1.00000	318.58	0.00100	259.90	0.05000	201.21
1571	0.01000	308.61	1.00000	308.61	0.00100	252.26	0.05000	196.09
1572	0.01000	301.43	1.00000	301.43	0.00100	246.73	0.05000	192.22
1573	0.01000	297.20	1.00000	297.20	0.00100	243.42	0.05000	189.64
1578	0.01000	318.58	1.00000	318.58	0.00100	259.90	0.05000	201.21
1579	0.01000	309.05	1.00000	309.05	0.00100	252.60	0.05000	196.32
1580	0.01000	308.10	1.00000	308.10	0.00100	251.87	0.05000	195.82
1581	0.01000	297.23	1.00000	297.23	0.00100	243.44	0.05000	189.66
1586	0.01000	318.58	1.00000	318.58	0.00100	259.90	0.05000	201.21
1587	0.01000	309.18	1.00000	309.18	0.00100	252.70	0.05000	196.39
1588	0.01000	308.10	1.00000	308.10	0.00100	251.87	0.05000	195.82
1589	0.01000	297.36	1.00000	297.36	0.00100	243.55	0.05000	189.75
1922	0.01000	652.22	1.00000	652.22	0.00100	537.55	0.05000	423.34
1923	0.01000	649.18	1.00000	649.18	0.00100	535.28	0.05000	421.83
1924	0.01000	651.00	1.00000	651.00	0.00100	536.97	0.05000	423.39

OPTIMIZATION SYSTEM FOR TPSSYM = 28

TOTAL NUMBER OF DESIGN VARIABLES = 32
TOTAL NUMBER OF CONSTRAINS = 480
TOTAL NUMBER OF TEMP. CONSTRAINS = 416
TOTAL NUMBER OF TEMP. PRINTOUTS = 13

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES





MAXIMUM TEMPERATURE OF EVERY LAYER

LAYER:	1	2	3	4
Tmax:	2300.33	2300.33	550.33	600.33
Optv:	1219.31	1219.31	545.73	545.73

VALUES OF DESIGN VARIABLES :

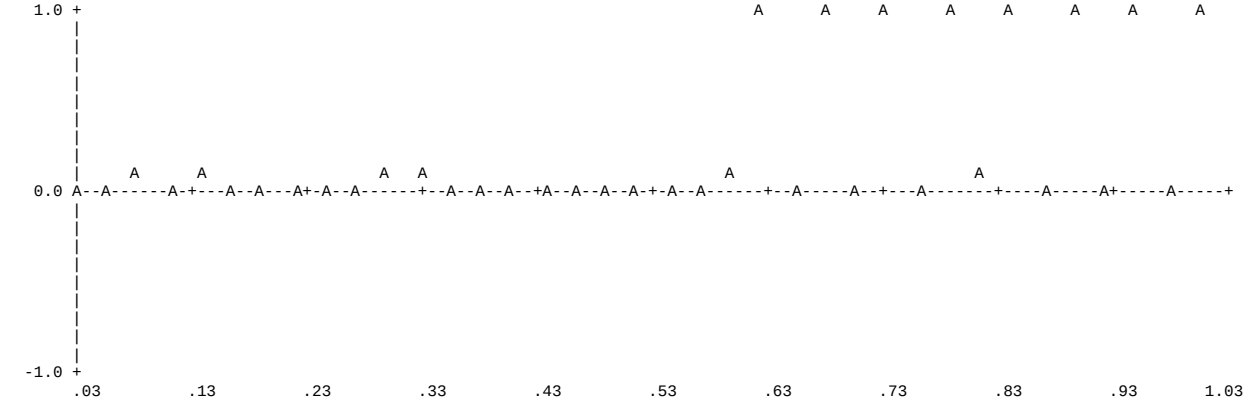
LAYER	DEV01	DEV02	DEV03	DEV04	DEV05	DEV06	DEV07	DEV08
1	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000
2	1.34764	1.42937	1.08076	1.29944	1.10274	1.23235	1.04155	1.12364
3	0.02953	0.02847	0.04056	0.03056	0.03218	0.02901	0.03729	0.03405
4	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000	0.05000

THE ORIGINAL OBJECTIVE FUNCTION = 47.4986687

THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.4382748

THE TOTAL OPTIMAL WEIGHT = 3.14044217E+03

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



OPTIMAL STRUCTURES OF TPS FOR PATCH = 28
(WITH AVERAGE THICKNESS)

HRSI COAT	thin skin	0.01000 in.	1219.3 F
LI-900 (P)	slab	1.20719 in.	1219.3 F
RTV-560	thin skin	0.03271 in.	545.7 F
17 LB SIP .16 IN	slab	0.05000 in.	545.7 F

THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH = 28

PANEL	LAYER01		LAYER02		LAYER03		LAYER04	
1858	0.01000	1041.89	1.04155	1041.89	0.03729	550.33	0.05000	544.25
1859	0.01000	1048.10	1.06719	1048.10	0.03628	550.33	0.05000	544.49
1860	0.01000	1054.82	1.09491	1054.82	0.03518	550.33	0.05000	544.74
1861	0.01000	1061.78	1.12364	1061.78	0.03405	550.33	0.05000	545.01
1866	0.01000	1039.44	1.10274	1039.44	0.03218	550.33	0.05000	542.08
1867	0.01000	1058.31	1.14014	1058.31	0.03119	550.33	0.05000	542.88
1868	0.01000	1081.24	1.18408	1081.24	0.03013	550.33	0.05000	543.85
1869	0.01000	1106.72	1.23235	1106.72	0.02901	550.33	0.05000	544.93
1874	0.01000	1080.80	1.08076	1080.80	0.04056	550.33	0.05000	543.76
1875	0.01000	1097.88	1.14010	1097.88	0.03773	550.33	0.05000	543.73
1876	0.01000	1120.13	1.21417	1120.13	0.03435	550.33	0.05000	543.72
1877	0.01000	1146.25	1.29944	1146.25	0.03056	550.33	0.05000	543.71
1882	0.01000	1167.96	1.34764	1167.96	0.02953	550.33	0.05000	543.91
1883	0.01000	1182.68	1.36866	1182.68	0.02943	550.33	0.05000	544.47
1884	0.01000	1199.85	1.39687	1199.85	0.02901	550.33	0.05000	545.06

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    1885   0.01000   1219.31   1.42937   1219.31   0.02847    550.33   0.05000    545.73

                  OPTIMIZATION SYSTEM FOR TPSSYM =    29


 TOTAL NUMBER OF DESIGN VARIABLES =   80
 TOTAL NUMBER OF CONSTRAINS       = 1640
 TOTAL NUMBER OF TEMP. CONSTRAINS = 1040
 TOTAL NUMBER OF TEMP. PRINTOUTS  =   13


MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
    X   0.1154E+04
   1.0 B         B         B
       |                             B
       |                                       B         B         B
       C                                                           B
       |         C         C         C         C                             B         B
       |                                       C         C         C                   B
       |                                                                 C         C
       E         E                                                                   C         B
       |                   E         E         E
       |                                       E         E         E         E         E         E         E
   0.0 +-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+
       |
       |
       |
       |
       |
       |
       |
       |
       |
  -1.0 +
       .08         .18         .28         .38         .48         .58         .68         .78         .88         .98       1.08
                                                              TIME  ( X 1.401E-44 )


              MAXIMUM TEMPERATURE OF EVERY LAYER
LAYER:        1        2        3        4        5
Tmax:   2800.33  2900.33  2700.33   550.33   600.33
Optv:   1153.58  1153.58   750.62   357.76   357.76

                  VALUES OF DESIGN VARIABLES :
LAYER    DEV01    DEV02    DEV03    DEV04    DEV05    DEV06    DEV07    DEV08    DEV09    DEV10    DEV11    DEV12    DEV13
DEV14    DEV15    DEV16
    1  0.01000  0.01000  0.01000  0.01000  0.01000  0.01000  0.01000  0.01000  0.01000  0.01000  0.01000  0.01000  0.01000
0.01000  0.01000  0.01000
    2  0.01000  0.01000  0.01000  0.01000  0.01000  0.01000  0.01000  0.01000  0.01000  0.01000  0.01000  0.01000  0.01000
0.01000  0.01000  0.01000
    3  1.00000  1.00000  1.00000  1.00000  1.00000  1.00000  1.00000  1.00000  1.00000  1.00000  1.00000  1.00000  1.00000
1.00000  1.00000  1.00000
    4  0.00100  0.00100  0.00100  0.00100  0.00100  0.00100  0.00100  0.00100  0.00100  0.00100  0.00100  0.00100  0.00100
0.00100  0.00100  0.00100
    5  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000  0.05000
0.05000  0.05000  0.05000

 THE ORIGINAL OBJECTIVE FUNCTION =    1618.3453369

 THE RATIO OF OPTIMAL OBJECTIVE FUNCTION =   0.1098325

 THE TOTAL OPTIMAL WEIGHT = 1.53156968E+04


MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
    X   0.1098E+00
   1.0 A
       |
       |
       |
       |
       |
       |
       |
       |
       |
   0.0 +-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+
       |
       |
       |
       |
       |
       |
       |
       |
       |
  -1.0 +
       1.00        1.10        1.20        1.30        1.40        1.50        1.60        1.70        1.80        1.90      2.00
                                                              TIME  ( X 0.000E+00 )

              OPTIMAL STRUCTURES OF TPS FOR PATCH =      29
```

```
                    (WITH AVERAGE THICKNESS)
============================================================   -----
                     ACC((N)              thin skin           0.01000 in.  1153.6 F
============================================================   -----
          0.03000 in. ZIRCONIUM                                  i
------------------------------------------------------------     i
                                                                   i
                                         radiation gap         0.01000 in.  1153.6 F
                                                                   i
------------------------------------------------------------     i
          0.03000 in. ZIRCONIUM                                    i
============================================================   -----
                                                                   i
                     LI-2200 (N)          slab                0.99980 in.   750.6 F
                                                                   i
============================================================   -----
                     RTV-560              thin skin           0.00100 in.   357.8 F
============================================================   -----
                                                                   i
                     17 LB SIP .16 IN     slab                0.04999 in.   357.8 F
                                                                   i
============================================================   -----
```

THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH = 29

PANEL	LAYER01		LAYER02		LAYER03		LAYER04		LAYER05	
681	0.01001	1109.29	0.01001	1109.29	1.00064	907.63	0.00100	518.36	0.05003	334.45
682	0.01000	1079.74	0.01000	1079.74	1.00007	876.57	0.00100	494.75	0.05000	317.00
683	0.01000	1001.62	0.01000	1001.62	0.99976	801.38	0.00100	442.91	0.04999	283.69
684	0.01000	952.86	0.01000	952.86	1.00000	756.06	0.00100	412.62	0.05000	265.99
685	0.01000	1055.95	0.01000	1055.95	1.00049	854.93	0.00100	478.30	0.05002	305.25
686	0.01000	1013.02	0.01000	1013.02	0.99999	810.84	0.00100	446.42	0.05000	284.37
687	0.01000	917.23	0.01000	917.23	0.99987	719.16	0.00100	385.07	0.04999	248.49
688	0.01000	887.16	0.01000	887.16	1.00000	691.35	0.00100	367.19	0.05000	238.83
689	0.01000	1015.81	0.01000	1015.81	1.00041	816.66	0.00100	449.94	0.05002	284.29
690	0.01000	962.41	0.01000	962.41	1.00006	761.21	0.00100	409.31	0.05000	258.94
691	0.01000	865.09	0.01000	865.09	0.99989	667.21	0.00100	346.95	0.04999	224.09
692	0.01000	821.33	0.01000	821.33	1.00000	626.97	0.00100	322.16	0.05000	211.71
693	0.01000	981.25	0.01000	981.25	1.00019	784.49	0.00100	426.51	0.05001	266.15
694	0.01000	931.91	0.01000	931.91	1.00010	732.16	0.00100	386.91	0.05001	241.88
695	0.01000	839.68	0.01000	839.68	0.99995	640.92	0.00100	325.07	0.05000	207.75
696	0.01000	757.34	0.01000	757.34	1.00000	564.70	0.00100	278.73	0.05000	185.40
697	0.01000	959.47	0.01000	959.47	1.00000	764.53	0.00100	412.13	0.05000	254.67
698	0.01000	919.38	0.01000	919.38	1.00000	722.32	0.00100	379.46	0.05000	233.66
699	0.01000	835.09	0.01000	835.09	1.00000	635.80	0.00100	317.74	0.05000	198.98
700	0.01000	692.35	0.01000	692.35	1.00000	501.71	0.00100	234.89	0.05000	158.72
835	0.01000	1142.26	0.01000	1142.26	1.00000	939.04	0.00100	544.36	0.05000	352.90
836	0.01000	1153.58	0.01000	1153.58	1.00001	950.29	0.00100	550.33	0.05000	357.76
837	0.01000	1153.58	0.01000	1153.58	0.99999	950.29	0.00100	550.33	0.05000	357.76
838	0.01000	1151.78	0.01000	1151.78	0.99997	947.27	0.00100	550.33	0.05000	357.76
839	0.01000	1130.15	0.01000	1130.15	0.99997	926.19	0.00100	535.93	0.05000	349.66
840	0.01000	1102.67	0.01000	1102.67	1.00000	899.46	0.00100	516.11	0.05000	335.97
841	0.01000	1073.63	0.01000	1073.63	0.99990	871.65	0.00100	495.68	0.05000	321.62
842	0.01000	1046.24	0.01000	1046.24	0.99979	845.48	0.00100	476.54	0.04999	308.14
843	0.01000	1024.43	0.01000	1024.43	0.99969	824.70	0.00100	461.47	0.04998	297.58
844	0.01000	1012.19	0.01000	1012.19	0.99965	813.08	0.00100	453.25	0.04998	292.01
845	0.01000	1153.58	0.01000	1153.58	1.00049	950.29	0.00100	550.33	0.05002	357.76
846	0.01000	1153.58	0.01000	1153.58	1.00014	950.29	0.00100	550.33	0.05001	357.76
847	0.01000	1153.58	0.01000	1153.58	0.99961	950.29	0.00100	550.33	0.04998	357.76
848	0.00999	1153.58	0.00999	1153.58	0.99899	950.29	0.00100	550.33	0.04995	357.76
849	0.00998	1153.58	0.00998	1153.58	0.99834	950.29	0.00100	550.33	0.04992	357.76
850	0.00998	1118.67	0.00998	1118.67	0.99775	916.41	0.00100	529.91	0.04989	345.68
851	0.00997	1081.00	0.00997	1081.00	0.99728	879.64	0.00100	503.30	0.04986	327.08
852	0.00997	1045.65	0.00997	1045.65	0.99702	845.12	0.00100	478.12	0.04985	309.44
853	0.00997	1018.24	0.00997	1018.24	0.99704	818.27	0.00100	458.35	0.04985	295.55
854	0.00997	1004.27	0.00997	1004.27	0.99740	804.48	0.00100	447.90	0.04987	288.22
855	0.01000	1134.18	0.01000	1134.18	0.99978	930.08	0.00100	534.94	0.04999	343.90
856	0.01000	1153.58	0.01000	1153.58	0.99958	950.29	0.00100	550.33	0.04998	357.76
857	0.00999	1153.58	0.00999	1153.58	0.99936	950.29	0.00100	550.33	0.04997	357.76
858	0.00999	1153.58	0.00999	1153.58	0.99915	950.29	0.00100	550.33	0.04996	357.76
859	0.00999	1153.58	0.00999	1153.58	0.99896	950.29	0.00100	550.33	0.04995	357.76
860	0.00999	1121.99	0.00999	1121.99	0.99880	919.22	0.00100	530.43	0.04994	344.40
861	0.00999	1077.00	0.00999	1077.00	0.99868	874.96	0.00100	498.39	0.04993	323.89
862	0.00999	1034.96	0.00999	1034.96	0.99862	833.42	0.00100	468.13	0.04993	304.38
863	0.00999	1003.19	0.00999	1003.19	0.99863	801.83	0.00100	444.91	0.04993	289.29
864	0.00999	988.78	0.00999	988.78	0.99876	787.25	0.00100	433.92	0.04994	281.94
865	0.01000	1046.99	0.01000	1046.99	1.00000	850.02	0.00100	479.09	0.05000	305.12
866	0.01000	1122.95	0.01000	1122.95	1.00000	928.38	0.00100	535.48	0.05000	337.16
867	0.01000	1153.58	0.01000	1153.58	1.00000	950.29	0.00100	550.33	0.05000	352.17
868	0.01000	1153.58	0.01000	1153.58	1.00000	950.29	0.00100	550.33	0.05000	353.63
869	0.01000	1134.37	0.01000	1134.37	1.00000	950.29	0.00100	550.33	0.05000	345.00
870	0.01000	1094.98	0.01000	1094.98	1.00000	922.80	0.00100	540.19	0.05000	329.75
871	0.01000	1050.44	0.01000	1050.44	0.99999	879.98	0.00100	510.78	0.05000	312.10
872	0.01000	1007.55	0.01000	1007.55	1.00001	836.22	0.00100	479.55	0.05000	294.47
873	0.01000	975.23	0.01000	975.23	1.00003	800.29	0.00100	452.67	0.05000	280.53
874	0.01000	962.10	0.01000	962.10	1.00004	781.01	0.00100	436.60	0.05000	274.00
1258	0.01000	968.69	0.01000	968.69	1.00005	783.09	0.00100	436.41	0.05000	275.97
1259	0.00999	993.30	0.00999	993.30	0.99902	791.49	0.00100	436.65	0.04995	283.44
1260	0.00998	1005.95	0.00998	1005.95	0.99796	805.94	0.00100	448.56	0.04990	288.70
1261	0.01000	1011.76	0.01000	1011.76	0.99979	812.58	0.00100	453.08	0.04999	292.43
1262	0.01000	984.12	0.01000	984.12	1.00005	795.64	0.00100	444.37	0.05000	281.96
1263	0.00999	1006.08	0.00999	1006.08	0.99930	803.99	0.00100	445.48	0.04996	288.94
1264	0.00998	1014.02	0.00998	1014.02	0.99848	813.62	0.00100	453.81	0.04992	292.47
1265	0.01000	1016.13	0.01000	1016.13	0.99999	816.61	0.00100	456.18	0.05000	295.25

1266	0.01000	1012.56	0.01000	1012.56	1.00002	818.60	0.00100	458.73	0.05000	292.96
1267	0.01000	1029.12	0.01000	1029.12	0.99963	826.51	0.00100	461.54	0.04998	299.13
1268	0.00999	1028.89	0.00999	1028.89	0.99916	827.87	0.00100	463.81	0.04996	299.64
1269	0.01000	1024.49	0.01000	1024.49	1.00000	824.80	0.00100	462.64	0.05000	300.15
1270	0.01000	1055.88	0.01000	1055.88	1.00000	852.66	0.00100	479.40	0.05000	309.35
1271	0.01000	1064.44	0.01000	1064.44	1.00000	860.96	0.00100	486.18	0.05000	314.87
1272	0.01000	1051.93	0.01000	1051.93	1.00000	849.91	0.00100	479.33	0.05000	310.78
1273	0.01000	1037.24	0.01000	1037.24	1.00000	837.27	0.00100	472.33	0.05000	307.37

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***                                ***
*** T P S O P T  T E R M I N A T E D ***
***                                ***
***          N O R M A L L Y       ***
***                                ***
***      03:37:52    08/26/2005    ***
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